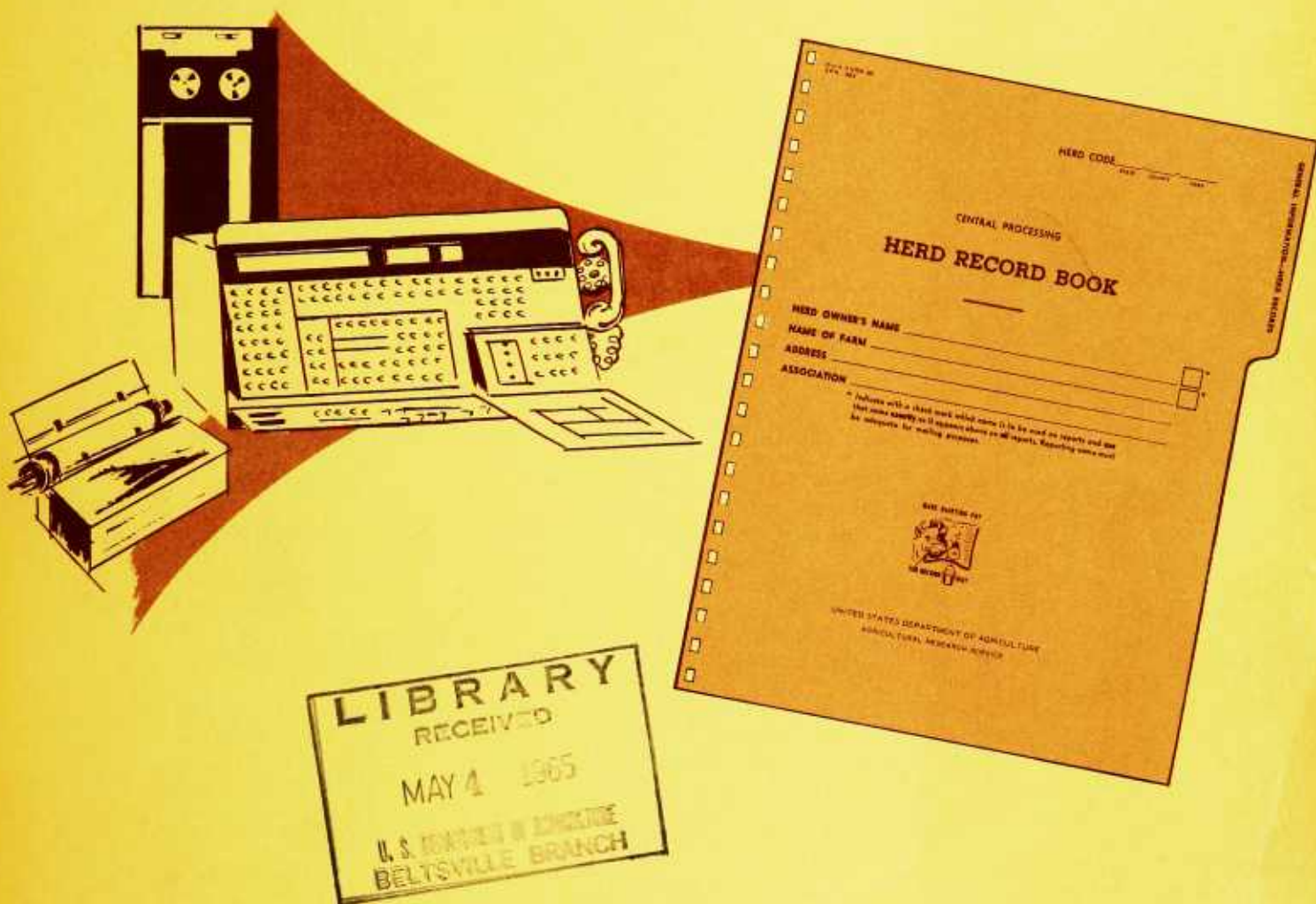


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THE NATIONAL COOPERATIVE DAIRY HERD IMPROVEMENT PROGRAM HANDBOOK



Agriculture Handbook No. 278

The Supervisor's Job

As an employee of a dairy herd improvement association, the supervisor is largely responsible for the accuracy and completeness of herd records. His position can be looked upon as that of operating manager. His ability will help the members of his association. In turn, his doing a successful job will bring credit to himself.

To be successful, the supervisor must be enthusiastic about dairying, and he should have a knowledge of up-to-date methods of breeding, feeding, and managing a dairy herd. He should be trained thoroughly for his work, because most of it requires special knowledge and skill.

The supervisor must report milk production and concentrate consumption for each cow in the herd, report milk price and forage amount and quality on a herd basis, and keep complete records so the dairyman can use the information as a guide in feeding and culling the herd for more efficient milk production. He must also keep complete, up-to-date identification records on all animals in the herd, so the dairyman can use the production records in a progressive breeding program.

The supervisor's records and reports are used not only by the individual dairyman and by the association, but also by the State extension services and the Dairy Cattle Research Branch at Beltsville, Md. They are used in research and educational programs and are a vital part of the USDA Sire Evaluation Program. It is most important that the supervisor fill out completely and properly the forms used in the association work. He should understand thoroughly the information wanted about each item in these forms and how to record it properly.

Because of the accuracy required in collecting and reporting the identification, production, and feed records, well-trained supervisors are of vital importance to the successful operation of the whole dairy herd improvement association program.

The purpose of this handbook is to provide the supervisor with the rules to follow in conducting DHIA work, general instructions for obtaining the production and feed records required, instructions for making the necessary identification of animals, and general instructions for preparing the various reports. This handbook, along with materials furnished by computing centers and State extension workers, provides the necessary reference material for the supervisor and instructor.

The supervisor should study the handbook carefully and refer to it frequently to insure that his work in the association always conforms to the high standards of the dairy herd improvement association program.

THE NATIONAL COOPERATIVE DAIRY HERD IMPROVEMENT PROGRAM HANDBOOK




DATA FORM 10
APR 1962

HERD CODE _____
STATE _____ COUNTY _____ HERD _____

CENTRAL PROCESSING
HERD RECORD BOOK

HERD OWNER'S NAME _____
NAME OF FARM _____
ADDRESS _____
ASSOCIATION _____

* Indicate with a check mark which name is to be used on reports and use that name exactly as it appears above on all reports. Reporting name must be adequate for mailing purposes.

DAIRY PAYING PAY

THE RECORD WAY

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

GENERAL INFORMATION—HERD RECORDS

By *Gerald J. King and Robert H. Miller*
Animal Husbandry Research Division

Agriculture Handbook No. 278

Acknowledgment

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Chapter I. The National Cooperative Dairy Herd Improvement Program

The primary purpose of the national cooperative dairy herd improvement program is to afford the individual dairyman an economical method of obtaining information he can use to improve the producing efficiency of his herd. The records of identification, production, feed cost, and income enable the dairyman to cull the least profitable cows, to feed the rest according to their production requirements, and to select the most suitable animals for breeding up the inherent producing ability of his herd. Thus, keeping accurate feed and income records is an important part of the recordkeeping program.

Dairy herd improvement associations are important as a service to the dairyman, as agricultural extension demonstration projects, as a source of information for sire evaluation, and for research studies. They are operated under the supervision of State extension workers and county agricultural agents, in cooperation with the Federal Extension Service and the Dairy Cattle Research Branch of the U.S. Department of Agriculture. The records from associations are used by extension personnel to demonstrate to nonmembers the value of the program.

Dairymen join an association, however, for the service it offers; and a group of dairymen—once convinced of the value of the dairy herd improvement program—organizes an association and employs one or more supervisors to provide a service, cooperatively for themselves.

A Dairy Herd Improvement Association

A dairy herd improvement association is an organization of dairy farmers who keep records by one of the following recordkeeping plans: the Standard DHIA plan, the Owner-Sampler plan, the Weigh-a-Day-a-Month plan, or any combination of the three. The members of the association elect a board of directors, and officers are elected either by the total membership or by the directors. The directors and officers conduct the business affairs of the association. They employ the supervisor, establish the testing charges, enforce the DHIA rules, and conduct such other business as may be required.

The supervisor determines the production of each cow in the herd and maintains animal identification and other records as required by the DHIA rules, the association board of directors, the county agent, the State extension dairyman, the computing center, and the USDA.

The association employs as many supervisors as are needed to conduct the testing work in the herds enrolled. Some associations operate a central testing laboratory where the milk samples are tested.

Statewide Organizations

In some States, the local associations have formed statewide organizations, or federations, which usually are financed by assessing member associations on a per-cow basis. The locals elect a board of directors for the State association, usually through delegates at the annual meeting. A State organization, in cooperation with the State agricultural college or university, can render valuable service to the dairy herd improvement program in the State in the following ways:

- (1) Establish State DHIA policies and rules;
- (2) coordinate the programs of the local associations;
- (3) interpret and enforce all DHIA rules uniformly throughout the State;
- (4) establish standards of performance for supervisors;
- (5) determine the status of the local associations for income tax purposes; and
- (6) arrange on a statewide basis such things as compensation and liability insurance for the supervisors and social security payments.

The Standard DHIA Plan

Regardless of the type of organization and method of operation, recordkeeping in herds under Standard DHIA is conducted as outlined in this handbook and according to the rules given in the appendix. Records obtained from herds on the Standard plan are used in the USDA sire evaluation and research program and by colleges and universities for research and educational purposes.

Usually a supervisor schedules 1 standard herd per working day, although on the average he will service 17 herds a month. The remainder of his time he will work with Owner-Sampler herds.

The Owner-Sampler Plan

As the name implies, in the Owner-Sampler plan, the herd owner records milk weights and takes samples for each cow in his herd. The samples are tested either by the supervisor when he visits the farm or in the central laboratory if one is operated. The records are processed at the computing center and are used by the dairyman for herd improvement purposes. The records are not used in the USDA sire evaluation program or for research, since the milk weights and samples were not obtained by the association supervisor.

In addition to Standard herds, it is usually beneficial for supervisors to service as many Owner-Sampler herds as possible. Many alert supervisors service more than 70 Owner-Sampler herds.

The Weigh-a-Day-a-Month Plan

The Weigh-a-Day-a-Month (WADAM) plan is very simple, requiring as little time and effort of a dairyman as is consistent with helpful recordkeeping. It is intended to supplement, stimulate, and complement the Standard DHIA and the Owner-Sampler plans. WADAM is usually handled through the county agent's office or the computing center, or both. It consists of the dairyman's weighing the milk produced by each cow on one day each month and reporting to the county agent or a computing center the milk weight; the plant butterfat test for the month; freshening, dry, purchase, selling, and death dates; and feed records (if desired). The computing service agency returns the calculated records to the dairyman who uses them as a guide to feeding, culling, and breeding. Although the records are unofficial, as are the Owner-Sampler records, they are of great value to the dairyman. This plan costs less than either the Standard or Owner-Sampler plans.

Dairy Herd Improvement Registry

The Dairy Herd Improvement Registry (DHIR) record is an electronically computed Standard Plan DHIA record intended to eliminate much of the duplication of cost and effort caused by the use of both the DHIA and the Herd Improvement Registry (HIR) testing programs, but with some additional requirements to meet the needs of the dairy breed organizations.

DHIR and Standard DHIA records are processed in the same manner at the State or regional computing center. A dairyman who wishes to enroll in the DHIR plan must apply to his breed association on appropriate forms, pay the required fee as established by the breed association, notify his extension dairyman, and agree to follow the rules applying to both Standard DHIA and DHIR. (The rules are included in the appendix.) The DHIR records processed by the State or regional computing center are forwarded to the respective breed association.

Broad Program of Herd Improvement

Since the beginning of cow testing associations in 1906, DHIA has grown to include, in 1964, a total of 2,822,522 cows in 67,664 herds located in the 50 cooperating States and Puerto Rico. This membership is serviced by 1,420 local associations and 2,474 supervisors. The total program is carried out through the cooperative efforts of DHIA members, local association directors and officers, central testing laboratories, county agricultural agents, State extension workers, State associations, State or regional computing centers, and the Federal Extension Service and the Animal Husbandry Research Division of the U.S. Department of Agriculture. The broad purposes, objectives, and responsibilities relating to the National Cooperative Dairy Herd Improvement and Sire Evaluation Programs are provided in a memorandum of understanding between the State Cooperative Extension Service, and the Federal Extension Service and the Animal Husbandry Research Division of the USDA. The memorandum is included in the appendix. This memorandum of understanding is also applicable to working relations between State DHIA organizations and local associations.

Records for Sire Evaluation and Research

Although each DHIA benefits its individual members, the information obtained from these associations is extensively used also on a nationwide basis. Production records from Standard DHIA and DHIR herds are provided by State or regional computing centers to the USDA in the form of either punched cards or magnetic tapes. In 1963, 1,320,423 lactation records were provided. These records are screened for accuracy, and by use of high-speed magnetic tape equipment, they are added to existing files and used for sire evaluation and research purposes.

The sire evaluation program, which provides sire evaluation services on a nationwide basis, is based on production differences between the daughters of a bull and their contemporary herd mates.

Because the use of superior sires is the surest and quickest way to improve the inherent producing ability of dairy herds, the Dairy Cattle Research Branch and the State extension services are cooperating in a nationwide program to evaluate all sires used in association herds and to aid in disseminating and perpetuating the hereditary influences of the outstanding sires. The herds from which these good sires come can become sources of breeding stock for improving the Nation's dairy cattle.

The records obtained in the Standard plan are also used to develop educational programs and research to aid the dairyman in improving the productivity and income from his herd through better breeding, feeding, and management practices.

Importance of Recordkeeping

Profitable dairying is realized through sound breeding, feeding, and management, each of which may be the limiting factor. High levels of production cannot be obtained from cows of inferior breeding no matter how well they are fed and managed. Likewise, cows of excellent breeding will not produce well in the absence of sound feeding and management.

Sound breeding emphasizes culling and selection of both cows and bulls. The low-producing cows must be recognized and culled as soon as possible to increase the productivity and profitableness of the herd. Low-producing cows usually can be detected after one lactation or, by alert dairymen, after only 3 to 4 months of lactation. It is important also that dairymen recognize and use the best bulls available, since this is the surest and most rapid way to bring about genetic improvement. The information needed in selecting bulls, especially those available in artificial breeding, is provided by the USDA Sire Evaluation Program.

Sound feeding and management consists of feeding good quality feed to each cow according to her current level of production and care as needed to insure optimum performance. The feeding program should be flexible, so that the relative amount of grain and forage fed may vary according to feed available and market demands.

Recordkeeping is not only desirable but essential for profitable herd performance. It requires that each cow in the herd be production tested to permit sound breeding, feeding, and management. In this way, individual cows can be culled or fed according to known producing ability and bulls can be selected with greater

reliability. This can be realized through membership in a dairy herd improvement association.

Cows enrolled in Standard DHIA have in the past produced from 60 to 80 percent more milk and butterfat than all other cows in the United States. Shown below are these production comparisons for selected years from 1930 to 1963.

Year	STANDARD DHIA COWS		ALL OTHER COWS IN THE U.S.	
	Milk (lb.)	Butterfat (lb.)	Milk (lb.)	Butterfat (lb.)
1930-----	7, 642	303	4, 435	174
1940-----	8, 133	331	4, 519	175
1950-----	9, 172	370	5, 118	202
1962-----	11, 032	426	6, 919	256
1963-----	11, 286	434	7, 029	260

Use of production records has been largely responsible for the superior performance of cows and herds being production tested. The following results, which represent Standard DHIA herds in the United States in 1964, show how these records enable the participating dairyman to increase not only production but also herd efficiency.

LOW FAT PRODUCTION (3.6-3.8 percent)

Milk production (pounds)	Value	Feed cost	Income over feed cost
6,000-----	\$276	\$155	\$121
8,000-----	351	177	174
10,000-----	424	203	221
12,000-----	506	232	274
14,000-----	601	267	334
16,000-----	688	293	395

HIGH FAT PRODUCTION (5.0-5.2 percent)

Milk production (pounds)	Value	Feed cost	Income over feed cost
6,000-----	\$320	\$151	\$169
8,000-----	430	187	243
9,900-----	552	235	317

A dairyman can increase his net profit and help control the milk surplus by selling unprofitable cows for

beef. To be profitable, a cow should produce at least \$2 worth of milk for each \$1 worth of feed she consumes. By disposing of unprofitable cows, a dairyman increases his net income and at the same time removes their milk from the market.

Proper and complete identification records coupled with impartial recordkeeping not only can provide information needed to cull intelligently but also can add to income. Grade and registered heifer calves, young heifers, and cows all bring more when a dairyman has records to prove the animal's worth. Anything above cost is more return on investment—a result of the use of a good recordkeeping system.

Accuracy of Records

High-speed electronic computers are being widely used to process DHIA records. As a result, greater accuracy is obtained in the overall recordkeeping system. However, no amount of data processing will replace the importance and need of accuracy by supervisors in recording data on the farm. Especially important is the accurate and prompt identification of calves, heifers, cows, dams, and sires and the proper recording of change of status codes and dates as they affect advancing lactations of cows. Also important is the accuracy of feeding and related management information, which is essential to the dairyman.

Recordkeeping data from Standard DHIA herds are used more and more extensively for the important work of research and sire evaluation. The reliability of these efforts, along with their usefulness to dairymen, depends largely on how completely and accurately the data are recorded by each supervisor.

Making DHI Information Public

Local publicity is valuable to association work in the community. The supervisor should cooperate with the board of directors and the county agent in preparing news articles. Stories that illustrate a recommended practice should be used in preference to mere statistical accounts. The real purpose of the testing work is to improve each individual herd. Stories of outstanding sires summarized in the association are of interest to all dairymen in the community. Herds in which unusual improvement has been made through association work are also good material for news stores.

Chapter II. Outline of Supervisor's Work

The daily routine of supervisors varies widely because of the use of automated data processing (ADP) procedures, the inclusion of Owner-Sampler testing in the routine of some supervisors having herds on the Standard plan, and bimonthly testing and the use of a central testing laboratory in some areas.

Regardless of the operating plan of the association, the DHIA supervisor's work is essentially as outlined in this handbook.

Although use of ADP procedures has reduced the calculating work required of supervisors, *complete and accurate reports are absolutely necessary*. It is vital to follow exactly the instructions given by the computing center for reporting the various components of the record. *Follow carefully the instructions in this handbook for reporting names, code numbers, and other figures in the record, and for the proper forming of letters and numbers to make them readable*. When incorrect data are used for any purpose, the published information loses its value.

To assist in maintaining uniformity and reliability in the Standard DHIA recordkeeping plan, rules have been established by the American Dairy Science Association and are shown in the appendix. The principal points of the rules are: (1) In each herd all weighing and sampling of milk must be done by the supervisor; (2) the testing of milk must be done either by the supervisor or by personnel of a central testing laboratory; (3) all cows of milking age in the herd, including dry cows, must be on test, regardless of ownership; (4) all cows, including dry cows, that have been on test in the herd during the year must be included in the yearly herd average; and (5) the supervisor (the term "supervisor" may include personnel of a central testing laboratory) must use or report the data obtained on the testing day as the basis for computing the production for the corresponding testing period.

These rules must not be modified. It is the supervisor's responsibility to see that the rules are followed. If any basic rule is not followed, records should not be reported or compiled as Standard DHIA records. General confidence in DHIA records is maintained and enhanced when all Standard DHIA testing work conforms with DHIA rules. Any supervisor who makes exceptions to the rules, or permits any association member to make exceptions, loses the confidence of that member and all other members of the association. Questions about interpretation of the rules should be referred to your board of directors.

Duties of the DHIA supervisor, while on the farm, are outlined generally as follows:

Evening Work

1. Arrive at the farm early enough to avoid causing any delay in the evening milking.
2. Before milking time, fill in all items not completed in the heading of the prelisted barn sheet.

3. Eartag all calves that have entered the herd since the last testing day unless they are otherwise suitably identified. Record the identification on appropriate forms. (See ch. X for eartagging procedures.)

4. Fill in all dates and change-of-status codes required by the computing center.

5. Positively identify each cow in the herd as the day's feed and milk records are obtained by comparing her markings, eartag number, or other identification with data in the herd-record book.

6. Weigh or measure the grain fed to each cow and determine on a herd basis the amount of forage consumed. Usually with the help of the dairyman you can estimate in the evening the quantity of feed to be fed in the morning. The amount of any feed refused must be subtracted from feed fed, to obtain feed consumed, which is the amount to report.

7. Weigh the milk of each cow in the herd and record weights on the barn sheet.

8. If the milking is done with a bucket milker, mix the milk from each cow thoroughly by pouring it three times from one pail to another; then take the sample. If a pipeline milker and meter are used, take the sample from the sampling device. If there is a weigh bucket or bell jar in the line, allow air to bubble through the milk for 1 second per pound of milk before taking the sample, to insure thorough mixing of the milk.

9. See that numbers on the sample jars of milk correspond with the numbers of the cows in the sample column on the barn sheet. Keep the sample jars tightly closed and securely locked while they are not under your supervision.

10. Immediately after each newly purchased cow is milked, eartag her if she does not have suitable identification and record the identification on appropriate forms.

11. Immediately after each cow that freshened or was purchased since the last visit is milked, use an approved heart-girth measuring tape to estimate live weight and record it in the proper column of the barn sheet and on the cow's individual record sheet.

12. Record the prices of concentrates and good-quality hay in your area. Some computing centers figure prices of all forages from the price of good hay. Record prices of other specific feeds and quality of the various forages if your center requires it.

13. Record the price of milk and butterfat and, if required by the local association, the price of protein and solids-not-fat.

14. Get as much of the required information as possible in the evening. The dairyman is likely to be too busy in the morning to have time to give you the data you need to complete your report. It is probably best to schedule a time to obtain data from the dairyman in order to insure that no item is missed.

15. Strive to assist the dairyman by discussing with him his breeding, feeding, and management program. Feel free to obtain assistance and materials from the county agent, computing center, and extension special-

ist. Become thoroughly familiar with the total recordkeeping system so that you can answer the dairyman's questions.

Morning Work

1. Be on the job before milking time. Weigh or measure the grain fed each cow (if you did not do so the previous evening). Check for feed refusals.
2. Weigh and sample the milk from each cow as at the evening milking.
3. Obtain a composite sample of the evening's and morning's milk of each cow for the butterfat test and, if required by the association, for protein and solids-not-fat test. Greater accuracy is obtained by using proportionate quantities from each milking to collect

the composite sample. If your testing work is done by a central laboratory, be sure that the composite samples are packed so as to prevent breakage during the trip to the laboratory. Otherwise, test the composite samples as required.

4. Transfer data from the barn sheet to the individual cow-record forms as needed.

5. Be sure that all entries for which you are responsible are complete in the dairyman's herd-record book.

6. Before you leave the farm, recheck all phases of the work to be certain that all items on the barn sheet are filled out properly, all individual cow records are brought up to date, and all necessary new identifications have been made. If you do not complete this work properly, the dairyman may justifiably think that you are not capable of handling the job.

Chapter III. Equipment for Weighing, Sampling, and Testing Milk

The procedures outlined in this chapter and in chapter V are in line with good recordkeeping practices. The equipment described is approved for use if no specific State regulations exist.

Weighing and Sampling Equipment

1. Two seamless large-capacity milk pails.
2. Field case with padlock for the following equipment:

a. *Scales*.—A special milk scale is required. It must have a capacity of 60 pounds, an adjustable hand, and a legible dial graduated in pounds and tenths of pounds; and it must be accurate within the limits set by the American Dairy Science Association (appendix, DHIA rule 1b).

b. *Milk-sample jars of 3- or 4-ounce capacity for each cow in the herd*.—They must be fitted with watertight lids or stoppers. Each sample jar and lid must be permanently numbered or have a place for recording the assigned sample number.

c. *Trays to hold sample jars*.—A wire mesh lid for each tray makes it possible to dump and wash a tray of jars at a time.

d. *Sampling device*.—A 30-ml. sample dipper (heavy type with rounded bottom), syringe, or milk-thief.

e. *Preservatives*.—Suitable preservative tablets, such as bichloride of mercury or sodium dichromate, must be used to preserve samples when they cannot be tested on the day they are taken or cannot be maintained between 30° and 40° F.

Testing Equipment for the Babcock Test

1. Electric centrifuge (24 or 36 bottles) with speed and heat control.—The heat control must maintain an operating temperature of 135° to 150° F. The operating temperature of the centrifuge should permit no appreciable rising or lowering of the fat columns when test bottles are transferred to the water bath. The operating speed must be controlled within the following (tolerance ± 25 r.p.m.):

Diameter of wheel (inches):	R.p.m.
18.....	800
20.....	759
22.....	724
24.....	693

Diameter of wheel is the distance between the bottom of the opposite cups, measured through the center of rotation when the cups are extended horizontally. Check the speed of the centrifuge at least monthly with the door of the centrifuge closed. An accurate tachometer permanently attached to the centrifuge is desirable.

2. Field case with padlock for the following equipment.

a. Approved Babcock test bottles.—Specifications: 8-percent, 18-gram, 6-inch milk test bottles, with 0.1 percent graduation. Test bottles must be unbroken, clean, and numbered consecutively or to correspond with the numbered sample jars.

b. Approved pipettes.—Each laboratory or place of testing must be equipped with three or more approved pipettes, calibrated to contain 17.6 ml. of water at 68° F.

c. Acid measuring devices.—Burettes, dippers, or other satisfactory acid measuring devices that will deliver 17.5 ml. of acid into the test bottle without spillage.

d. Acid bowl.—Approximately 5 inches in diameter and 4 inches deep, if a dipper is used.

e. Electric heater for water bath (small hotplate) if an electrically heated and controlled water bath is not used.

f. Water bath.—The water bath must maintain water at 135° to 140° F. The tank should be copper or other rustproof material marked with indentations to indicate the proper water level (top of fat columns for either 12, 18, or 24 test bottles).

g. Bottle rack to go in water bath.—The rack should have partitions between bottles and holes in the bottom of rack. The holes should not be directly underneath the bottles.

h. Shield to hold test bottles in position in rack and some device to hold the rack and bottles in position when they are submerged for washing.

i. Thermometers.—Two or more accurate milk thermometers (floating, 20° to 220° F.).

j. Calipers or other approved reading devices for measuring the fat columns.—Calipers must have parallel needle points and adjustable tension.

K. Acid hydrometer.—A sulfuric acid hydrometer (1.80 to 1.85 sp. gr. at 68° F.) must be available to check the specific gravity of the acid. If acid is too strong (above 1.825 at 68° F.), the following adjustments can be made:

- (1) Use a suitable acid bottle, polyethylene, or stainless-steel container. An ordinary glass jug may break from heat.
- (2) Add one pipette (17.5 ml.) of water per quart of acid for each 0.005 drop in specific gravity required.
- (3) Add slowly a small amount of acid, and mix. When the container has been uniformly heated, add additional acid until required specific gravity has been attained.

l. Three brushes.—1 test-bottle brush; 1 sample-jar brush; 1 pipette brush.

m. Small oil can and oil.

n. Cow marking crayons.

o. Dixon 352 white pencil.

- p. Weight tape measure.
- q. DHIA ear tagging outfit.
- r. Extension cord with a 3-prong plug-in socket or 2-prong socket with grounding wire.
- 3. Sulfuric acid.—Sulfuric acid for the Babcock test, having a specific gravity of 1.82 to 1.825 at 68° F., must be plainly labeled and stored in safe containers with tight stoppers or lids.

4. Carrying case with padlock for acid jug.

5. Water.—A supply of clean water must be available for washing equipment and making the tests. Water at 150° F. or above must be available to add to the test bottles while the test is being made.

6. Reading light.—Each laboratory or place of testing must be equipped with a suitable diffused light located at eye level height so as to give a clear outline of the fat column.

Other Recommended Equipment

1. A case for record forms.
2. Moisture tester.—A moisture tester is a very useful tool for determining the actual moisture content of green feed and silages. Actual moisture values will likely be more accurate than values on coding charts.
3. Test bottle shaker.
4. Test bottle washer.
5. Acid pump.
6. Automatic timing device.
7. Double wash sinks.
8. Acid disposal sink.

Equipment For TeSa Test

Equipment for the TeSa test is assembled into a kit by the manufacturer and should be ordered as such. The amount of glassware included in the kits varies, in order to serve herds of different sizes. The manufacturer is Technical Industries, Inc., 2711 SW. 2d Ave., Fort Lauderdale, Fla.

Equipment for Protein and Solids-Not-Fat Determinations

The procedures for determining protein and solids-not-fat (SNF) are relatively new. If such procedures and equipment are needed, consult your local board of directors or State extension dairyman and include any printed material about these tests with this handbook.

Equipment for a Central Laboratory

The standards for equipment are the same for central laboratory testing as for field testing. The only differences are the number of each item stocked and the storage facilities needed.

Care of Testing Equipment

The condition and appearance of the testing equipment often indicate the quality of work being done. Keep equipment clean and in good operating condition at all times. While most of the equipment listed is for the Babcock test, other equipment requires the same general care and cleaning procedures.

Centrifuge

Keep the centrifuge clean. Oil it frequently with a high-grade lubricant. Keep it adjusted properly and in repair. For repairs, see your board of directors. Operate the centrifuge only on a level, firm foundation. Start and stop the machine slowly.

Scales

Keep the scales clean and free from rust. Do not drop or overload them. Wrap the scales in a dry cloth and keep them in a kit or dry box when not in use. Check the accuracy of the scales frequently, especially if they are old. Methods for checking accuracy are described in chapter IV. With inaccurate scales, you can obtain only worthless, misleading records, and you are wasting your time and the dairyman's money.

Glassware

Glassware is expensive. Use, store, and carry it with care. If your supervisor's kit does not provide a specific place for the glassware, wrap it separately and carry it so jarring or shifting of equipment will not cause breakage.

Acid

Acid will burn holes in clothes and will burn the skin. In fact, it will burn or damage practically everything (except rubber or glass) with which it comes in contact. You must regard the acid as dangerous and handle it accordingly.

If you accidentally spill acid on your skin, wash it off immediately. It is good practice to keep your hands wet while pouring the acid. Keep baking soda in your kit, handy for use in neutralizing spilled acid. To bring acid to the proper temperature, place it in a warm room in the evening, if possible. If the acid must be warmed in the morning, place the jug in a warm-water bath. If the acid and jug are cold, warm the jug in a lukewarm-water bath. Never place the jug in hot water or on a stove to warm it; the heat may crack the jug and permit the acid and water to mix, which would cause an explosion with probably disastrous results.

Always keep acid away from children. After you have completed the test, empty the test bottle and any milk to which you added preservative on an ash pile or some place where children or animals cannot get to it. Do not empty test bottles down a drain; the acid will damage the plumbing and may interfere with the bacterial action where septic tanks are used.

Carrying Case for Acid Jug

Carry acid in a strong, glass jug with a hard-rubber stopper. Carry the jug in a strong, locked, wood case. The case should be made of not less than ¾-inch material, and it should be padded on the sides and bottom to fit the jug snugly. It should be just deep enough so that when the lid is closed and locked, it automatically holds the jug stopper firmly in place. Keep the jug in the case at all times except when warming the

acid in a water bath. When carrying the acid in a car, place it so that it will not tip over and so that in case of a traffic accident it cannot spill on the occupants of the car.

Cleaning Equipment

Test Bottles

1. While they are still hot, empty the test bottles in a safe place where acid will do no damage. Shake the bottles while emptying them, to keep sediment from sticking to the glass.
2. Rinse the bottles with cold or lukewarm water.
3. Replace the bottles in the water bath. Add a good dairy cleaner (not soap); put a little cleaner in the neck of each bottle.
4. Add hot water to the water bath until water fills the test bottles.
5. Wash the bottles thoroughly; use a stiff brush on the necks of the bottles. If dirt has accumulated inside the bottles, add BB shot with the cleaner, and rotate the bottles vigorously.

6. Empty the bottles, ~~rinse with warm water~~; and invert to drain.

7. Rinse with hot water and invert to drain and dry.

Other Equipment

1. As soon as possible after use, rinse the sample bottles, pails, dippers, and other equipment with cold or lukewarm water.
2. After rinsing, scrub thoroughly with a stiff brush, using hot water and a good dairy cleaner.
3. Follow the washing operation with a hot-water rinse—the hotter the water, the better.
4. A final rinse in a chlorine solution (200 parts per million) or quaternary ammonium compound solution will destroy bacteria on the equipment and help to keep future milk samples from souring.
5. Invert and air-dry the equipment to prevent rust.

Source of Supplies

Your board of directors will advise you as to where and how to obtain supplies, equipment, glassware, acid, alcohol, TeSa reagent concentrate, and other materials.

Chapter IV. Weighing and Sampling Milk

Responsibility of Supervisor

The cows being milked must be located so that you can observe the milking at all times. It is your responsibility to check the weighing device for accuracy before milking, to weigh all milk or observe the weight being accumulated for all cows, to record the weights on the barn sheet, and to take and preserve the milk samples for testing.

Weighing and Sampling When a Bucket-Type Milker Is Used

It is preferable to use varying standard weights, which you can obtain from your board of directors, to check the accuracy of a dairy scale. A scale should meet the standards set by the American Dairy Science Association (appendix, DHIA rule 1b) or the standards in your State, whichever are higher. A bucket of known weight and various measures of water (8.3 pounds equals 1 gallon) can also be used.

Weighing

Hang your scales at eye-level height at a place in the barn where you can observe all milking operations at all times. Adjust one hand on the milk scale so that it will rest on zero with the empty, but wet, pail. Always read the adjusted hand and record the milk weight to the nearest "tenth" of a pound.

Sampling

At each milking, pour the milk of each cow from one pail to another three times to insure that the milk is mixed thoroughly before you take a sample. The test will be more accurate if you use proportionate quantities from each milking to make up a composite sample for each cow. This is best done by placing a full sample dipper of milk from the first milking in the sample bottles and then varying the amount of milk added from the next milking according to the weight of the milk obtained from that milking. For example, if the second milking is heavier than the first, add a full dipper plus a little additional milk. If the second milking is lighter, add less than a full dipper of milk from that milking. The composite sample should always be large enough to run two tests if necessary. Also, the sample should be large enough to provide milk for other tests if it is being tested for more than one factor.

Weighing and Sampling When Pipeline Milkers Are Used

Various systems of weighing and sampling milk from individual cows have been developed for use with pipeline milkers. One weighing and sampling device—the

Milk-O-Meter—has been approved by the American Dairy Science Association and the State regulatory agencies for use in the Standard DHIA program. See appendix, DHIA rule 1, for the requirements to be met by any equipment used in the Standard program.

Proper Installation and Use

Proper installation and use of any weighing and sampling device is important for accurate results. You are responsible for the accurate weighing and sampling of each cow's milk. You should become familiar with the operation of the device before using it in the Standard DHIA plan. Most manufacturers provide instructions for the correct installation and operation of weighing and sampling devices. You should study them carefully.

Procedure for Using Weighing and Sampling Devices

Collection Containers in Milkline From Cow

Attach collection containers in the milkline between the cow and the pipeline to collect each cow's milk separately. The containers may be milker pails, milk cans, or similar vessels with special covers for trapping the milk. Check to see that the container is empty before each cow is milked. When the milking for each cow is complete, cut off the vacuum from the milkline, and empty the milk into your weigh pail. Weigh and sample the milk in the usual manner.

Milker Pail or Bell Jar With Scales

1. *Checking for accuracy.*—Remove the pail or jar from the scales, and test the scales as described earlier in the chapter.

2. *Weighing.*—Weigh according to the following procedure:

a. Be sure that the adjusted hand on the scale points to zero before the unit is attached to the cow.

b. Be sure that all connecting hoses are long enough to permit free movement of the container.

c. Be sure that all connecting hoses are in the same position when you read the milk weights as they were when you made the zero reading.

d. See that the valves of the pipeline are turned so as to prevent any milk from one unit entering another during the first unit's emptying.

e. Take all weights before any milk is released. If the container will not hold all of the milk from one cow, drain the milk into a weigh pail and weigh it in the usual manner.

3. *Sampling.*—Proper sampling is essential to the conduct of the test.

a. After weighing the milk and before releasing any of it into the milkline, mix it thoroughly by opening a

sampling valve at the bottom of the container to let air bubble through the milk. To assure adequate mixing, continue air agitation for 1 second per pound of milk.

b. Mixing by other methods, such as shaking, rolling, and tipping, should be adequate to assure sufficient agitation.

c. Take the sample. The amount should be proportionate to production as explained in chapter IV, under "Sampling."

d. If the container will not hold all of the milk from one cow, drain all the milk into pails for mixing before taking a sample.

The Milk-O-Meter

The Milk-O-Meter is a metering device that is installed in the milking line from the cow to the pipeline for automatic weighing and sampling of the milk while the cow is being milked. The meter should be properly assembled before each milking. Holding clamps should be permanently installed for each location where the meter is to be used. Care should be taken to see that the clamps will hold the Milk-O-Meter firmly in a level position. The vacuum must be maintained at the proper level.

1. *Field test for accuracy.*—Check the Milk-O-Meter monthly for accuracy, as follows:

a. Place the Milk-O-Meter, without the Sampler but with the shell stopper in place, in a level position and on a solid base. A pipe clamp may be used or a vat edge stand adjusted to hold the meter level.

b. Connect a hose from a water tap to the upper spout.

c. Let 2 or 3 pounds of water run through the meter and then shut off the water.

d. Place an empty clean pail, previously weighed, under the meter to catch water so that none is spilled.

e. Set the dial pointer at zero.

f. Slowly open the water valve or tap until water is flowing through the meter at the rate of 4 pounds or 16 "clicks" per minute—NO FASTER.

g. Shut off the water when 17 pounds is registered on the meter dial.

h. Weigh the pail and water on a scale known to be accurate.

i. Deduct the weight of the pail and compare the net weight of water to the Milk-O-Meter dial reading.

j. With a meter reading of 17 pounds, a scale reading of 16½ to 17½ pounds is within accuracy requirements. If the reading is outside these limits, repeat the check.

k. If the same results are obtained on the second check, the meter probably needs to be recalibrated;

it should be returned either to the factory or to an authorized service center.

2. *Weighing.*—The steps for weighing are as follows:

a. Before using the Milk-O-Meter and with the vacuum on, check the shaft attached to the pointer to see that it moves freely.

b. Set the pointer on zero before each cow is milked.

c. After milking is completed for each cow, reach behind the dial and trip the rocker shaft once before reading the weight. This allows for the small amount of milk that may be left in the meter when milking stops.

3. *Sampling.*—A small amount of milk accumulates in the sampling chamber during the milking process. After each cow is milked and the milk weight has been taken, remove the outlet cover of the sampling chamber while the vacuum is still on. This mixes the milk sample and removes the excess milk in the sampling chamber. Cut off the vacuum through the meter to let the milk drain into the sample jar.

Be sure all the milk has drained from the sampling chamber before the next cow is milked.

Other Methods

Check with your board of directors before using other weighing and sampling devices.

Care of Milk Samples

Keep each cow's milk sample in a clean, tightly closed, numbered milk-sample jar. The number of each sample jar might well be painted on the lid with enamel paint to insure greater permanence. The number should correspond with the sample number listed for the cow in the "sample" column on the barn-book sheet. Keep the sample jar in a locked box or case.

Do not test sour or frozen samples of milk. In freezing weather, keep the samples in a warm place. In extremely hot weather, keep the samples in a cool place or use a preservative. Corrosive sublimate or potassium dichromate tablets may be used according to the directions of the manufacturer, to keep the samples from souring. **CAUTION: Preservatives are very poisonous and must be kept away from children and animals. Milk samples that have been treated with preservatives and that are not used in making the test must be disposed of where children or animals cannot get to them.**

To insure reliable records and to prevent outside criticism, you must keep all milk samples, glassware, and any blank forms you carry under lock and key at all times except when you are actually using them.

Chapter V. Testing Milk

The Babcock test and the TeSa test are used for butterfat determinations in dairy herd improvement associations.

Testing Whole Milk by the Babcock Method

If your State regulatory agency has issued rules for conducting the Babcock test, follow them; otherwise, the test should be conducted as follows:

Heating the Centrifuge

Start the electric centrifuge heating, so that it will be at 135° to 150° F.

Tempering

1. If the test is to be run on fresh, individual milk samples, adjust the temperature of these samples to between 60° and 70° F. in a water bath just before mixing them and taking the pipetted sample for the test.

2. Place the jars holding the composite milk samples in a water bath with the surface of the water slightly above the level of the milk in the bottles.

3. The temperature of the bath should not exceed 100° F. at the time you place the cold samples in it. Composite samples and those with preservatives must be tempered to between 95° and 100° F. Do not shake or mix the milk in the sample jar until the milk has reached 90° F.

4. If any sample becomes diluted with water, discard it, and make a permanent record of the date of the accident and identity of the sample.

Mixing Before Pipetting

After the composite sample of milk reaches 95° to 100° F., mix it as follows:

1. Pour the sample into a mixing container and back into the original sample jar three times. Drain the mixing container for at least 15 seconds before using it again. Rotate the jar to loosen any cream; use a spatula if necessary. Be sure that cream does not stick to the cap or stopper. Overheating or rough shaking may cause the sample to *churn* and *oil off*.

2. Pipette the sample immediately after mixing.

Temperature of Milk for Pipetting

When you pipette the sample, the temperature of the milk should be between 90° and 100° F.

Pipetting

1. Rinse the pipette with milk before working with the first sample.

2. Place the tip of the pipette into about one-half the depth of the milk in the sample bottle. Fill the pipette and adjust the topmost surface of the milk to the graduated mark (17.6 ml.) on the suction tube. Insert the entire delivery tube of the pipette into the neck of the test bottle before releasing the milk. The lip of the test bottle should be vented, preferably with a grooved rubber gasket at the base of the bulb of the pipette.

3. When the pipette has drained for about 10 to 15 seconds after free flow has stopped, blow out the last drops or remove the pipette from the test bottle with a quick upward movement to force the last drops from the tip of the pipette. You will find it advantageous to use two pipettes alternately.

4. Cool the pipetted samples to between 60° and 70° F. before adding the acid.

Sulfuric Acid

1. Use sulfuric acid with a specific gravity of 1.82 to 1.825 at 68° F.

2. The acid should be between 60° and 70° F.—the same temperature as the milk.

Adding Acid to the Milk

1. The temperature of the milk at the time of adding the acid should not exceed 70° F.

2. Add 17.5 ml. of acid slowly to each sample. Hold the neck of the test bottle at an angle and rotate it as you pour, so the acid will flow down the sides of the bottle neck and wash all milk out of the neck.

3. Mix the sample with a smooth, rotary motion. Continue to shake for one-half minute after all curd has disappeared. The time of shaking is very important in obtaining accurate tests. Rough, delayed, or slow shaking will cause dirty fat columns. The same is true of too little or too much acid. If you are using a preservative in the milk, mixing for 3 minutes is recommended. Experienced supervisors can pour acid and then shake a tray of samples at one time. However, test bottles must be handled carefully to avoid charring before shaking is started. Properly handled, the mixed samples will have a dark chocolate color with no visible curd. An automatic shaker is an excellent timesaver.

Centrifuging

Transfer the test bottles immediately to a heated centrifuge. Bottles must be counterbalanced by having

the opposite cups filled. Use test bottles filled with water or with duplicate tests if necessary.

1. Centrifuge at full speed for 5 minutes.
2. Add water (150° F. or above) to within one-fourth inch of the base of the neck of the test bottle.
3. Centrifuge again for 2 minutes.
4. Add water to bring the fat within the graduated space in the neck of the test bottle. *Do not overfill.*
5. Centrifuge again for 1 minute.
6. Use water, free from oil. To soften hard water, add about two drops of sulfuric acid to each quart of water. *Never* add water to acid.

Water Bath

Transfer the test bottles immediately to a water bath at 135° to 140° F. Temper for 5 minutes. Be sure that the water is above the top meniscus of the fat columns. (The meniscus is the saucer-shaped surface at the ends of the fat column. The bottom of the meniscus is the bottom of the saucer, and the top of the meniscus is the outer rim of the saucer.)

Reading Tests

1. Be sure that the entire fat column is within the graduations on the neck of the test bottle.
2. Remove each test bottle separately from the bath; hold it perpendicularly in front of a diffused light; and measure with a measuring device the length of the fat column from the bottom of the lower meniscus to the top of the upper meniscus.
3. Measure the fat column on the ungraduated side of the neck and read the test from the graduated scale.
4. Read the fat test to the nearest 0.1 percent.
5. Do not read the test if the fat column is foamy, burnt, or curdy, or if the meniscus is irregular. If such tests are used, inaccurate results will be obtained.
6. Do not empty the sample jars until all tests have been verified and recorded. Rerun all questionable tests. All tests that are abnormally high or low in relation to breed, stage of lactation, or previous records on the cow or herd should be verified by duplicate tests of samples involved.

Defective Tests

A test is considered defective and inaccurate if the fat column is milky or indistinct, or if flakes of casein or charred material are in or below the fat column, and you should repeat the test. The following information should be helpful in correcting procedures that result in defective tests.

Dark-Colored Fat Column

A dark-colored or burned fat column containing dark particles near the lower meniscus is usually caused by improper mixing or by one of the following:

1. The acid was too strong.
2. Too much acid was used.
3. The acid was too warm when it was added to the milk (over 70° F.).
4. The milk was too warm when the acid was added (over 70° F.).
5. The acid was dropped directly into the milk. (The test bottle should be tilted so the acid will flow down the sides.)

6. The mixing was interrupted before the solution was complete.

7. The acid and the milk stood too long before being mixed.

8. The action of the acid was too fast because of failure to use rotary motion in mixing milk and acid.

Light-Colored Fat Column

A light-colored fat column containing white curdy material or sediment near the lower meniscus may be caused by one or more of the following:

1. The acid was too weak.
2. Too little acid was used.
3. The acid was too cold when it was added to the milk (under 50° F.).
4. The milk was too cold when the acid was added (under 50° F.).
5. The mixing was not continued long enough to dissolve all the milk solids.
6. The centrifuge was operated too slowly.

Foam on Fat Column

Foam appearing on the top of the fat column in the test bottles, obliterating the upper meniscus, usually is caused by the use of hard water containing carbonates. You can usually remove the carbonates from the water before it is used by adding a few drops of sulfuric acid to the water and stirring vigorously to insure that the chemical reaction is completed. *Never* add water to acid.

The TeSa Test

Preparing TeSa Reagent for Butterfat Determination of Raw Milk

TeSa reagent solution.—Dissolve TeSa reagent concentrate powder in any clean water. The 40-test package makes 500 ml., or 1 pint of solution. The 160-test package makes 2,000 ml., or 2 quarts of solution. To avoid loss due to foaming, the powder should be added slowly to about two-thirds of the total water required. After the reaction has subsided, add water to make the total volume required. **MIX AT LEAST 6 HOURS BEFORE USE.**

Milk Test Reagent

To prepare TeSa milk test reagent, add one part of methanol or commercial grade wood alcohol to five parts of TeSa reagent solution. The solution *MUST* have been mixed at least 6 hours. Milk test reagent may be used as soon as prepared. Use milk test reagent for testing fresh or preserved raw milk.

General Precautions

TeSa TEST REAGENT SOLUTION SHOULD NOT BE USED MORE THAN 2 WEEKS AFTER THE SOLUTION IS PREPARED. MILK TEST REAGENT CONTAINING ALCOHOL SHOULD NOT BE USED MORE THAN 3 DAYS AFTER PREPARATION.

It is important that the time in the boiling bath be at full temperature. Begin timing when vigorous boiling resumes.

IN READING ALL TESTS BY THE TeSa METHOD, READ THE TRUE LENGTH OF THE FAT COLUMN—FROM THE BOTTOM OF THE UPPER MENISCUS TO THE BOTTOM OF THE LOWER MENISCUS.

NOTE.—Boiling time for preserved samples is 15 minutes; for other milk, 10 minutes.

Mercuric chloride (corrosive sublimate), sodium dichromate, potassium dichromate, or formalin (37 percent formaldehyde solution) may be used as preservatives. Use the minimum amount of preservative necessary for the sample size and holding time.

Testing Raw, Unpreserved Milk

1. Pipette or measure 17.6 ml. of a well-mixed sample at 59° to 68° F. into the side arm tube of a TeSa milk test bottle.

2. Add 15 ml. of TeSa milk test reagent through the side arm of the TeSa bottle and mix at once with a swirling motion to uniform color.

3. Place in a boiling water bath deep enough to cover the liquid level in the test bottles. Allow the test bottles to remain in the bath at least 10 minutes after active boiling resumes.

4. Remove the bottles from the boiling bath and place them on a table at room temperature. Add hot water through the side arm tube of each TeSa bottle

until liquid entirely fills the lower bulb of the test bottle. Then go back over the tray of bottles and add hot, clean water to bring the top of the fat column to near zero on the reading scale. Allow bottles to stand at room temperature for 5 minutes. Do *not* use water from the boiling bath.

5. Transfer the bottles to a tempering bath (132° to 140°F.) deep enough to cover the fat column in the neck of the bottle. Just before placing the tray of bottles in the tempering bath, agitate with a rotary motion.

6. After tempering for 3 minutes, remove the bottles from the bath and immediately read the fat percentage indicated in the center of the column. Read from the **BOTTOM** of the upper meniscus to the **BOTTOM** of the lower meniscus.

Testing Composite Preserved Samples of Milk

Use the same procedure as for raw, unpreserved milk—**EXCEPT** for item 3. Boil for 15 minutes, instead of 10 minutes.

Test for Protein and Solids-Not-Fat

In some States, milk is being tested for protein and for solids-not-fat. If yours is one of these States, your board of directors or the State extension dairyman will give you material outlining the procedures to be used. Include this material as a part of the handbook.

Chapter VI. Interpreting the Testing Period

Testing Date

The testing date is the date you finish the test on a farm. If you arrive at the farm in the afternoon of the 19th of the month, the day you leave—the 20th of the month—is the testing date. If it takes 2 days to test the herd, and you leave the farm on the 21st of the month, the 21st is the testing date.

Enter the testing date (month, day, and year) in the space or spaces provided in the heading of the barn sheet.

Centering Date

Most cows decline in production as their lactation progresses. Therefore, they must be tested approximately in the middle of each month in order to get an accurate estimate of their production for that month on a calendar-month basis. Since all herds cannot be tested in the middle of each calendar month, a monthly testing period is established for each herd. To do this, a centering date is assigned to each herd the first month it is tested. Usually the date on which you test the herd the first month becomes the established centering date for the herd. The monthly testing period begins 15 days before the centering date and ends 12 to 15 days after the centering date, depending on the number of days in the month. Thus, the centering date always falls about the middle of the testing period. In assigning centering dates you must consider your route and the location of the herd in relation to other herds in the circuit.

Once you have established a centering date for a herd, it remains the same month after month even though you do not test the herd on exactly this date each month. You should vary your visits to each farm so that succeeding testing dates will fall in a period 3 days before to 3 days after the established centering date. This is to insure that the dairyman will not know the exact date of your arrival and that the time of milking and feeding procedures will be the same as though you had not come that day. Weighing and sampling the milk will, of course, cause some delay in the milking, but this is unavoidable. Unless you change your route, the herd will have the same centering date year after year. If you assume your duties in an association already in operation, use the centering date previously established for each herd. In a new association without a full membership at the time testing is started, leave several "open" centering dates in your schedule for new members who join the association at a later date.

Give large herds that cannot be tested in 1 day only one centering date for the entire herd. If it takes 2 days to test the herd, the second day is the centering date; if it takes more than 2 days, the day near the

middle of the test is the centering date. The local DHIA board of directors and the State extension dairyman determine the number of cows to be tested daily. Generally, a supervisor should not work with more cows daily than he can complete work with in 1 day (appendix, DHIA rule 7).

Enter the same established centering date for the herd each month in the space provided on the heading of the barn sheet.

New Herds Coming Into Association During Testing Year

Frequently a new herd coming into an association during the year is located so that, to avoid unnecessary travel, you should test the herd at a time in the month in which all the centering dates have been assigned. However, since you have a range of 7 days (3 days before and 3 days after the centering date) in which to test a herd, you usually can assign a centering date to a new herd even though it may result in two herds in the same association having the same centering date. When too many herds have the same centering date, you may reassign the centering date for the various herds. When this is necessary, you must make certain calculations or report the situation to your computing center for their special attention in order to adjust the cows' records for the resulting "overlap" or "gap." Your computing center will give you instructions on how to handle this situation.

Monthly Testing Period

To report records correctly, you must understand and remember that you are reporting production and feed records for a testing period, not for a calendar month or months, and that the testing period for each herd varies with each centering date.

After the centering date is established for a herd, you can easily determine the testing period for each monthly test by referring to the monthly table (appendix table 1). (If the association operates on the bimonthly testing plan, use appendix table 2 to determine the inclusive dates of, and the number of days in, the bimonthly testing period.)

Each month, after you have entered the established centering date for the herd on the barn sheet, refer to the appropriate table to obtain the inclusive dates for the corresponding testing period. Enter the correct dates (month, day, and year) in the space provided in the heading of the barn sheet if your center requires them.

You will refer to the inclusive dates of a testing period many times even though you do not normally calculate records by hand. With the dates in this

handbook, it will not be difficult to calculate the correct number of days for cows in milk or cows coming into or leaving the milking herd during the testing period when you are required to make corrections.

Days in Testing Period

If the association operates on the monthly testing plan, the number of days in the testing period is the same as the number of days in the calendar month in

which the centering date falls. (If the association operates on the bimonthly testing plan, the number of days in the testing period is the number of days in the month in which the centering date falls plus the number of days in the preceding month.) However, it is not necessary for you to calculate the number of days in the testing period because this information is given in appendix tables 1 and 2. You should always refer to these tables rather than trust your memory as to the number of days in the various testing periods.

Chapter VII. Reporting Data for the Testing Period and Special Situations

Reporting data on production, feeding, and income of the dairy herd varies among the computing centers. This is necessary and desirable for several reasons. One reason is the difference in the characteristics of dairy-farm operations in the various areas of the United States. Another reason is the difference in the kind and completeness of the records kept in the various States. A third reason is the variation in capacity of the several types of computers now in use. The purpose of this chapter, therefore, is to enumerate the items of the monthly report included on forms from one or more of the computing centers that you need to check to insure a complete report of data from the herds you test, to emphasize proper and legible reporting, and to list some special situations which will require instructions from your computing center. Each center will need to issue detailed instructions for reporting data on the forms it uses.

Report Full Herd Code

In order to handle and process individual dairy production records in volume and to satisfactorily identify the herd in which the record was made, each herd must have a herd code number.

A uniform herd code numbering plan has been developed that will accurately *identify each herd* and at the same time *indicate the type of record* being kept in the herd.

The herd code number consists of eight digits. The fifth digit indicates the type of plan—Standard, Owner-Sampler, Weigh-a-Day-a-Month, DHIR. Examples follow:

1. For Standard Dairy-Herd-Improvement-Association records, the herd code is as follows: 27-01-0001. This number indicates the following:

State No.	County No.	Standard No.	Herd no. within county
27	01	0	001

If the first digit after the county number (the fifth digit) is 0 through 6, the herd is on Standard plan recordkeeping. See item 2 below for use of 6 as the first digit after county number.

NOTE:—Herd codes now assigned to Standard herds can continue to be used by simply placing a "zero" in front of the present three-digit number now used to indicate the herd within the county.

2. The only time 6 is used as the first number after the county number in a Standard herd code is when a herd is one of several owned by the same owner. If a herd is to be divided into several herds, the last three numbers can be in whatever sequence is determined

in the county, but the first digit after the county number should be 6 for every herd. An example follows:

State No.	County No.	Standard No. (1 of several herds of same owner)	Herd No. within county
27	01	6	001
27	01	6	024
27	01	6	025

The herds in this example were managed as one herd, No. 27010001 for some time, then were divided into three herds after herd codes 27010002 through 27010023 had been assigned in the county.

3. For Owner-Sampler records, the herd code would be as follows: 27-01-7001. This number indicates the following:

State No.	County No.	Owner-Sampler No.	Herd No. within county
27	01	7	001

The first digit after the county number, 7, indicates Owner-Sampler recordkeeping.

4. For Weigh-a-Day-a-Month records, the herd code number would be 27-01-8001. This number indicates the following:

State No.	County No.	Weigh-a-Day-a-Month No.	Herd No. within county
27	01	8	001

The first digit after the county number, 8, indicates Weigh-a-Day-a-Month recordkeeping.

5. For herds on DHIR test, a State may elect to use the following system: The first digit after the county number will be changed from the original number to 9. For example, if a herd with a code number 27-01-0001 begins DHIR testing, its number would change to 27-01-9001.

Assignment of Herd Codes

1. *By the State extension dairyman.*—Herd codes both for herds on Standard DHIA test and for herds on test in Owner-Sampler testing *should be assigned by the State extension dairyman.* At the time the State extension dairyman assigns the herd codes, it is suggested that he should (1) set up a *ledger record* in which to list by county, by herd code numbers, in

~~numerical order, the name and address~~ of the dairymen, thereby eliminating any possibility of assigning a herd code to more than one herd; and (2) fill out the *file card* (DHIA 1108) listing the name of the dairyman, his mailing address, and herd code number for filing in alphabetical order.

These two files—the ledger record and the card record—will provide cross-reference files so that the herd code record may be readily referred to either by number or by the name of the dairyman.

Herd codes must *never be reassigned* if identification of herds in which the records are made is to be maintained. Example: John Doe is assigned herd code 27-02-0020. As long as John Doe is a member of a Standard DHIA, his herd records and his cows' 305-day lactation records are reported and placed on file carrying his herd code number, 27-02-0020. Should John Doe drop out of DHIA, his code number must be dropped and never reassigned to a new member. Thus, as long as records from John Doe's herd are on permanent file, they will be definitely identified as having been made in Herd 27-02-0020.

2. *By the county agricultural agent.*—It is suggested that the Weigh-a-Day-a-Month herd codes be assigned and recorded by the office of the county agricultural agent. The office of the State extension dairyman would assign each county the first *five* digits of the herd code number to be used in each county.

State No.	County No.	Weigh-a-Day-a-Month No.	Herd No. within county
27	01	8	001
To be assigned by State office			To be assigned by county office

The county office would assign the last *three* digits for each herd code. It is suggested that, in the county, a simple *ledger record* of herd codes be established to record in numerical order all herd codes assigned. **NO HERD CODE MUST EVER BE REASSIGNED TO ANOTHER HERD.**

Price and Value of Product

Many pricing formulas are used over the United States. Use the method used by the dairyman or recommended by your local board of directors. Generally, the price reported should be the plant price. Examples of some pricing formulas follow:

Whole Milk

If whole milk is sold according to butterfat content, determine the price on the basis of the average price received for whole milk.

If milk is sold at both base and surplus prices, calculate the average price as follows: Suppose 20 percent of the milk is sold at a surplus price of \$3 per 100 pounds, and the remaining 80 percent is sold at a base price of \$4.50 per 100 pounds. The average price is $(\$3 \times 0.20) + (\$4.50 \times 0.80)$, or \$4.20. Report this price.

If whole milk is sold by the gallon or quart, convert the gallon or quart price to price per hundred pounds. This is done by dividing the price per gallon by the pounds of milk per gallon (8.6) and multiplying that answer by 100.

When milk is bottled and sold to the retail trade at a price competitive with milk sold in stores, report about 50 percent of the selling price. Disregard the remaining 50 percent of the retail price, which is considered cost of delivery. These percentages vary, depending on the price of whole milk at the dairy plant. Use whatever percentages apply in your area.

Butterfat and Skim Milk

When milk is separated on the farm, and the cream and skim milk are sold separately, report the hundred-weight price of milk as the sum of prices for butterfat and skim milk in the hundred pounds.

Usually, however, when milk is separated, only the cream is sold, and the skim milk is fed on the farm. The value of the skim milk must be included in the total value of the product, or the cows will not receive full credit for the product. Consult your board of directors if the dairyman cannot give you details of pricing butterfat and skim milk.

Protein and Solids-Not-Fat

If your association prices milk on the protein or SNF basis, obtain instructions from the dairyman or your board of directors for determining these values.

Report Correct Identification Numbers

In reporting identification numbers, take great care to be sure that you do not omit or transpose digits in copying numbers. Also, be sure that you are reporting the correct number, not the number of the dam or sire of the cow whose record you are reporting. In reporting DHIA, AI, or disease-control eartag numbers, report the entire number, including the prefix, as 51-WAA-7814. Do not omit the "51" or the letters "WAA."

Check each report after you have it ready to mail, to be certain that the information on the report is exactly as it is recorded in the herd-record book.

Breed Codes

- | | |
|---------------|----------------------------|
| 1—Ayrshire | 6—Milking Shorthorn |
| 2—Guernsey | 7—Red Dane |
| 3—Holstein | 8—Mixed, Other, or Unknown |
| 4—Jersey | 9—Red Poll |
| 5—Brown Swiss | |

A herd should be coded as a particular breed if 75 percent or more of the cows are of that breed. If at least 75 percent of the cows in the herd don't belong to one of the breeds listed above, the herd should be coded "8" for breed.

Reporting Days on Test, Days in Milk, and Days Dry

Each cow must be credited with the correct number of days on test, in milk, and dry in each testing period if her production and feed records are to be correct for the testing period, for the year, and for her lactation period. Cows not in milk every day of the testing period are those that freshened, dried off, aborted, died, were purchased, or were sold during the period. Under DHIA testing, heifers are not considered a part of the herd until the fourth day after calving, counting the calving day as the first day. Be sure to follow

your computing center's instructions for reporting this information.

Report Correct Dates

Errors in reporting dates occur frequently. Check the herd-record book carefully to be sure you have not reported one date for another—for example, a breeding date for a freshening date, or vice versa. After you have recorded the dates on the report form, check to be certain that you have not confused the various dates and that you have copied them correctly.

Remarks

If the form has a column or space headed "Remarks," enter in this space important notes and data for which no other space is allotted and which the center must have to compute records. This space can also be used to enter ear-tag numbers of calves or other information useful to the dairyman.

Reports Must Be Complete, Accurate, and Neat

Read this section frequently. The seriousness of reporting incomplete or inaccurate data cannot be overemphasized. Not only are incomplete and inaccurate reports worthless, but also they may actually be harmful. Inaccurate data will result in an inaccurate evaluation of a sire, or false conclusions from herd data. The following tabulation shows the effect of certain errors in reporting feed amounts and quality on Concentrates Indicated, one of the columns used by some computing centers.

	<i>Effect on concentrates indicated (pounds)</i>
Errors in reporting—	
Hay (2 pounds).....	1.
Silage (5 pounds).....	1.
Forage quality (1 grade).....	2 or more.
Forage dry matter (2 percent).....	1.
Body weight at calving (100 pounds).....	1-2.

Observe the following precautions to avoid making errors in reporting data:

Write Figures Plainly

1. Write digits 2, 3, 5, 6, 8, 9, and 0 plainly by forming the circular parts so that there is plenty of open space in the enclosed or partly enclosed space of the digits. Also, see that the circular portions of 6, 8, and 9 are completely enclosed, but that the circular portions of 2, 3, and 5 are left open. When the circular portion of a 5 is closed or nearly closed, it often resembles a 6.

2. Leave the 4's open so that they will not look like 9's, and close the 9's so that they will not look like 4's.

3. Make the digit "one" as a straight line (1) without any "tick" at the top of the line. Many times the "tick" of a 1 is large enough to look like the bar at the top of the 7. Similarly, make 7 distinct so it will not look like 1.

4. Write figures so plainly that anyone not familiar with your writing can read the numbers correctly.

Write Names Plainly

1. Write or print names and addresses of herd owners so plainly that anyone not familiar with your writing can read and spell them correctly.

2. Make all letters distinct—take care to make the first letter of names especially plain. Print capital letters like S and L, M and W, or A, C, and O so that no one will confuse one letter with another.

3. Write small letters plainly. Letters like g, y, and z; h and k; m, n, and r; u and v are easily confused unless they are written carefully. Unless the i's are dotted and the e's are looped, these two letters are also easily confused. Loop the l's and cross the t's so that one letter will not be confused with the other.

4. If your handwriting is not plain, print the names and addresses of herd owners.

5. Include the herd identification number on all reports, and write the herd-owner's name exactly as it appears on the title page of the herd record book.

Special Situations

Special situations that require instructions from the computing center are as follows:

1. Lost milk.
2. Lost samples.
3. Sick or injured cows.
4. Abnormal tests.
5. Failure to obtain milk weights or samples, or both, on any cows in the last month of an association year when the herd is not going to be on test again.
6. Change of centering date.
7. Nurse cows.
8. Aborting cows or other cows freshening without going dry.

Retests—Owner's Request

If for any reason a herd owner is not satisfied with the test on his herd, he may call for a retest. You may stay on the farm another day to run the retest. If the owner prefers another supervisor, he should notify his board of directors, and a retest may be arranged as soon as another supervisor is available. The herd owner will be required to pay for the retest unless otherwise determined by the local board of directors. All cows tested on the first test must be included in the retest. "The use of the requested retest and the regular test shall be at the discretion of the State extension dairyman" (appendix, DHIA rule 16).

Surprise Test—DHIA

Surprise tests may be conducted on Standard herds for verification of records of high-producing cows and herds and for investigation of rule infractions. They may be ordered by the State or local organization and/or the State extension dairyman.

The use of the surprise test and the payment thereof shall be determined by the organization requiring such tests. Surprise tests shall be preceded by a preliminary dry milking.

Surprise Test—DHIR

For information on how to conduct surprise tests for herds on DHIR, see appendix, DHIR rule 18.

Chapter VIII. Calculating Records

Even though records are calculated at a computing center, the supervisor may be required to make some of the same calculations that are necessary for hand-calculated records. This chapter is included to aid the supervisor in making these calculations.

Milk Weights for the Current Testing Period

To obtain the total for milk, multiply the daily total by the number of days the cow was in milk during the testing period. Round according to instructions from your computing center.

Butterfat for the Current Testing Period

After you have found the percentage of butterfat for each milk sample, multiply the total pounds of milk produced during the testing period by the percentage of butterfat to obtain the butterfat produced during the period. Round to the nearest whole pound.

Protein and Solids-Not-Fat

After the percentage of protein or SNF, or both, has been determined, calculate the total pounds for the testing period in the same way as for butterfat.

Fresh Cows

The record of a fresh cow begins on the fourth day after calving, counting the calving day as the first day, but her milk is not tested earlier than the seventh day after calving, counting the calving day as the first day. For example, if a cow freshens on the 21st of the month, her record begins on the 24th, but do not test her milk before the 27th. You can take the first milk weights and samples on the evening of the sixth day after calving—in this example, on the evening of the 26th.

If a cow has not been fresh 6 days before the testing date, do not report her fresh or calculate her production for that testing period until your next visit to the farm. To complete her record and bring it up to date, use the weight and test you obtain for her second month of production to calculate her production for the previous testing period. This is known as giving "back credit."

First-calf heifers are started on test on the fourth day after calving, counting the calving day as the first day. A first-calf heifer would be on test and in milk the same number of days in the first testing period, and her production and feed records would be calculated for only the number of days in the testing period since her record began.

Purchased Cows or Herds Started on Test

If a purchased cow enters a herd and has calved within 90 days of the current testing period, all her production may be credited to her. The same is true of cows in a herd just starting the testing program. Purchased cows with DHIA records in progress should have their production to the date they entered the herd transferred to the computing center so that the record can be completed. Purchased cows that have not been in a recordkeeping program and that have been fresh not more than 90 days at the end of the current testing period get production credit from the date they enter the herd.

You will need to get instructions from your computing center for handling this situation.

Dry Cows

Charge cows that are dry on the testing date, but were in milk for some of the testing period, for feed consumed for the full testing period, but give them production credit for only the number of days they were actually in milk from the beginning of the testing period up to and including the last day milked. Since you cannot obtain milk weights and samples during the current testing period, calculate the cow's production credit on the basis of daily weights and tests obtained the previous month. This procedure is often referred to as calculating "forward" credit from a previous test. (See appendix table 5.)

Cows Sold and Cows Died

If a cow in milk is sold during the testing period, give her production credit and charge her for feed consumed for the actual number of days she was in the herd within the inclusive dates of the testing period. Include her production on the day she leaves the herd.

If a cow is sold before the testing date, calculate her production and feed records for the number of days she was in the herd on the basis of the daily weight and test you obtained the previous month.

Calculate feed and production records for cows that die during a testing period in the same way as for cows sold. (See appendix table 5 for calculations for both situations.)

Aborting Cows

Aborting cows are not tested until the seventh day after aborting. If a cow aborts while dry, calculate her record in the same way as for a fresh cow.

If a cow aborts while in milk after carrying a calf 152 days, her current record ends and a new lactation begins. Calculate her production for that part of the testing

period before the abortion on the basis of her last test before the abortion. Allow a lapse of 3 days, and calculate her production for the remainder of the testing period on the basis of her first test after this 3-day period. Note these facts in the "Remarks" column on the barn sheet and on the cow's individual record sheet.

If the cow that aborts while in milk cannot be tested on the testing date, credit her on the barn sheet for production to the day she aborts, based on her previous test, and consider her dry for the remainder of the testing period. On the next testing date, give her "back" credit for production that should be included in the testing period in which she aborted.

If a cow aborts after the testing date but before the end of the testing period, you have already reported her production for the period. When you record her production for the next testing period, report this situation as a correction to the computing center.

Cows Freshening Without Going Dry

If a cow freshens without going dry, calculate her production record in the same way as for a cow that aborts while in milk.

305-Day Lactation Records

Appendix figure 2, "Supervisor's Work Sheet for Calculating Lactation Records," shows how to calculate 305-day lactation records.

Changing the Centering Date

When it is necessary to change the centering date for a herd, an adjustment will be required for the production of each cow in milk. Ask your computing center for instructions on calculating the adjustment in production.

Calculate Records Correctly

A study of errors made by supervisors in reporting 305-day lactation records revealed the following types of errors:

1. *Incorrect number of days in lactation.*—This error usually occurs in the first monthly testing period after a cow freshens. Many supervisors give the fresh cow credit for the total number of days in the first monthly testing period. Usually this is incorrect. Give the fresh cow production credit for only the actual number of days she is in milk during the first testing period. This can be done easily by following the procedure in the Year-Day Table (appendix table 6) for calculating days in milk. Similarly, when a cow goes dry, give her production credit only for the number of days she is in milk during the last testing period of her lactation. Follow carefully the procedure outlined under "Dry Cows" earlier in this chapter and use the Year-Day Table for calculating "Days Dry" (appendix table 6).

2. *Errors in addition.*—Most errors in addition are due to carelessness. Record or align the data so the columns of digits cannot be confused. Many errors occur because the supervisor drops or adds a digit, or switches from one column to another in adding. Always check your addition.

3. *Errors in calculation.*—Errors also occur in calculating the data for "Production Since Last Fresh."

Chapter IX. Feed Reports

Naming Feeds

Report definite names or codes of succulent and dry forages, individual grains, and feed supplements. Green chop may be included either as pasture or as succulent forage. Follow your computing center's instructions as to how to report green chop. If a home mixture of grains and supplements is fed, record it as "Home Mix" and give the percentage of total (crude) protein. If a commercial mixture is fed, record it as "Com. Mix" and give the percentage of total (crude) protein. Only one figure for amount fed should be reported for each class of feed, unless your computing center gives you different instructions.

Weigh or measure carefully the amount of grain and concentrates fed each cow on the testing date to determine accurately the amount each cow consumes daily. The amount consumed is the amount fed minus the feed refused. Record the amount consumed daily (to the nearest pound) in the space provided.

Forage

The amount of succulent and dry forage consumed by individual cows in the herd is difficult to determine. If it is impractical to obtain actual weights of forage fed to individual cows, first determine the total amount consumed (total fed minus any refused during the 24 hours covered by the testing day) by the herd, and then either divide this uniformly among all the cows or prorate it according to the weight of the individual cows.

By checking closely with the dairyman, you usually can determine with reasonable accuracy the total amount of forage consumed by the herd. Hay often is baled. Multiply the number of bales fed daily by the average weight of the bales to obtain the total daily weight of hay fed. In the same way, multiply the number of baskets, carts, or carriers of succulent forage fed daily by the average weight of the baskets, etc., to obtain the total daily weight of the forage. If succulent forage is fed from a wagon, trailer, or truck, figure 20 pounds per cubic foot. The amount of forage refused by the cows should be subtracted from the amount fed in order to obtain forage consumed, which is the figure to report.

Always indicate forage quality according to the quality codes issued for your area by your computing center or the State extension dairyman. For determining quality of succulent forage, the use of a field moisture

tester is strongly urged. This equipment will aid greatly in determining quality of forage.

Price and Cost of Feed

Follow the instructions of your computing center for reporting prices of feed fed to the dairy herd.

Suggested Amounts of Grain To Feed

If the barn sheet has a "Concentrates Indicated" column, discuss the amount given each month with the dairyman. Accurate reporting of feed fed and forage quality is essential if the figures in this column are to be of any use to the dairyman. If the feed reported is accurate, the concentrates indicated should have real meaning. If the barn sheet does not include this information, it can and should be discussed with the dairyman anyway. You can recommend grain feeding according to the production of the cows. The dairyman should vary the recommended weights of grain to fit special cases, such as cows that are in poor condition, cows that are gaining weight, and cows that are off feed.

Estimating the Weight of a Cow

A dairyman must know how much his cows weigh if he is to feed each cow according to her maintenance and production requirements. The computing center also needs this information to figure the indicated concentrates, the feeding index, and the rate of forage feeding.

Use the special measuring tape, which is a part of your supervisor's testing equipment, to estimate the weight of a cow by her heart-girth measurement.

To take the heart-girth measurement, place the tape directly back of the cow's front legs. The cow should be standing squarely on all four legs. Draw the tape snug. Then read the estimated weight direct from the tape.

Estimate the weight of the cow the first month she is fresh, and record her weight in the space provided on the barn sheet and on her individual record form. Estimate the weight of purchased cows the first month they are tested.

Chapter X. Identification Records

Improvement of the Nation's dairy cattle through breeding is one of the important objectives of the DHIA program. A progressive breeding program is possible, however, only when each cow and her sire and dam are properly identified and production tested.

The DHIA breeding program is not confined to herds or associations within a State. Family lines of dairy cattle frequently extend to herds widely scattered in different associations or in different States. With the identification record of each animal established and recorded in the dairyman's herd-record book so that it can be reported accurately when production records are reported, the production records can be used to locate animals (both male and female) and families of animals that possess and transmit inheritance for high producing capacity. Such animals may then be used as breeding stock to spread the improved hereditary influence they possess throughout the dairy population.

Identification and Production Records

Every dairy animal in a DHIA herd must be positively identified and have her identification recorded in the dairyman's herd-record book within 60 days after the animal enters the herd by birth or purchase. Acceptable identification shall be (1) a registration number, or (2) a uniform-series eartag as used in DHIA, disease eradication, and artificial breeding (State code, three-letter prefix, four digits). Cows born before January 1, 1957, that have the old-series eartag numbers will continue to use them.

Tattoo numbers, branded numbers, or private eartags are not acceptable forms of identification by themselves, but they can be used for on-the-farm identification if the animals also have a registration number or a uniform-series eartag. (See appendix, DHIA rule 3, for more complete information about eartagging.)

Establishing Identity

Identity is not established until a record of the identification is made.

DHIA Eartags

A special DHIA eartag is used. The tag has a sealing device that makes removal of the tag very difficult, if it is inserted properly. One side of the tag bears the name of the State and the letters "D.H.I.A." On the other side of the tag is one of the uniform-series numbers.

The manufacturer supplies each State with eartags, using a numbering plan in each State that is a part of the national numbering plan. This plan avoids du-

plication of numbers in any State or between States.

In some States, the State extension dairyman distributes the eartags to supervisors and keeps a complete record of the serial numbers of all tags distributed to each supervisor. In other States, this is handled by a State regulatory agency.

Animals To Be Eartagged

You must give all unidentified animals a DHIA eartag. All milking animals that carried a temporary identification as heifers must be registered or retagged with an acceptable identification.

When all the animals in a herd have been either eartagged or registered and their identification numbers have been recorded, only newborn stock and purchased replacements will need to be eartagged and recorded to keep the entire herd identified.

The Supervisor Is Responsible for the Eartag

All calves should be eartagged as soon as possible after they are born. Sometimes you will give a dairyman a group of eartags so that he may eartag all young stock and all replacements not registered or eartagged that are born or that otherwise enter the herd between your visits. However, you are responsible for the eartagging of all association animals, and you must account for every tag in the identification record.

Affixing an eartag is a simple process, but it should be done methodically and with great care. You or the dairyman should take the necessary time to affix the tag properly and securely. Use special pliers to affix the tag. The pliers cause the prong of the tag to pierce the ear and expand within the sealing button, in one operation.

Seat the eartag properly in the jaws of the pliers so that it is held securely. The button side of the tag, bearing the name of the State and the letters, D.H.I.A., must lie flat and snug in the grooves of the jaw of the pliers. In this position the pronged side of the tag bearing the identification number *will not* lie flat against the other jaw of the pliers. If seated in this manner, the tag is held securely and will not move sideways in the pliers.

You must tie the animal securely so that it cannot move its head. It is not enough simply to have the animal in a stallion. If the animal is able to move its head even slightly, the prong may be bent or the tag shifted in the pliers so that it will not seal properly.

Place the tag in the *top* of the *right* ear about one-third the distance from the head with the *numbered side of the tag on the outside of the right ear*. In this position the tag is secure and may be read easily. Avoid placing the tag in the curvature near the base

of the ear, as this may result in irritation and possible loss of the tag. In a mature animal, place the tag so that the curved end will be flush with the edge of the ear. On young stock place the tag so as to allow approximately one-fourth inch for growth of the ear. After the tag has pierced the ear, you must apply strong pressure to the handles of the pliers to insure that it is clinched and sealed securely. If you take these precautions, few tags will be lost.

Lost Tags

If you affix eartags properly, very few will be lost. But if an animal does lose an eartag, you should affix a new one on your next visit to the farm. When you retag an animal, the original number remains her reporting number. The new number is recorded with

the old number in the herd-record book to keep it up to date, but the new number is used *only* for on-the-farm identification. Follow the instructions of your computing center when retagging any animal.

Recording Identification Data

The most important part of identifying animals with eartags is the record of that identification. Merely eartagging an animal is not in itself sufficient. To complete the identification, you must make a record of the eartag number together with the identification number of the sire and dam of the animal.

Record in the herd-record book the identification of every animal in the herd that is registered or is eartagged (including the identification numbers of the sire and dam).

Chapter XI. Herd Improvement Through Breeding

Genetic improvement in herd performance is realized through the recognition and use of superior sires and cows. The use of sires of known genetic superiority is the most effective single method because one bull may leave many progeny; selection among cows is limited because of such losses as injuries, mastitis, and breeding failure. Consequently, major emphasis should be placed on recognition and use of genetically superior bulls.

Sires are now being evaluated by the method of herdmate or contemporary comparisons in the National Cooperative Dairy Herd Improvement and Sire Evaluation Program. The basic principle of the herdmate comparison is that a sire can be evaluated by comparing the production of his daughters to the production of other sire progeny groups that were fed and managed under the same conditions. This method is superior to the previously used daughter-dam comparison because it minimizes the importance of production differences from year to year and from herd to herd. The reliability of the herdmate comparison method is further increased by adjusting for the following factors for each sire: (1) the number of herdmates each daughter has, (2) the number of daughters of the sire, and (3) genetic differences between herds.

The USDA-DHIA sire evaluation program provides sire summaries representing DHIA and DHIR herds on a quarterly basis. Each sire having five or more production-tested progeny with production-tested herdmates qualifies for summary. Individual sire records are made available to the Extension specialists in charge of testing in each State in which a sire's progeny is represented, as well as to the appropriate national breed association office and, in the case of bulls used in artificial insemination (AI), to the appropriate AI organization. Bound copies representing summaries of all sires evaluated are distributed in a similar manner.

Artificial Insemination

In AI, sires are normally used in many herds and, consequently, under varying feeding and management conditions. Under these conditions, sires having production-tested progeny and herdmates in more than 20 herds can be appraised and their future performance accurately predicted. Consequently, the USDA-DHIA sire evaluation program provides "predicted averages" for sires in AI and is especially useful in comparing these sires, which have been used in a wide variety of herd conditions.

Naturally, it is not possible to predict *exactly* how a sire will perform in a particular herd. However, bulls which sire daughters that produce well above their herdmates in one herd will do the same in other herds. This general superiority will be evident at all levels, but will be slightly less in high-producing herds than in low-producing herds. The dairyman can use the

average difference between daughters and herdmates as a guide in predicting how the daughters of a particular bull may perform in his own herd.

Natural Service

Evaluation of sires used under natural service conditions differs from evaluation of sires used in AI in that the former are normally tested and used in a single herd or in a relatively few herds. Bulls used in natural service are also evaluated in the USDA-DHIA sire evaluation program by contemporary herdmate comparisons and the information is made available as previously described. Unfortunately, sire evaluations on a within-herd basis are not as accurate as those on a multiherd basis. Consequently, predicted averages are not provided as they are for sires in AI. Herdmate comparisons are made, however, and these comparisons are very useful in evaluating natural-service bulls and in estimating the future performance of their progeny in the herd.

Improvement Through Culling of Females

Genetic progress by selection of cows is difficult because of limited opportunity to select on the basis of production. Selection can be made more effective by good herd management, which reduces losses of cows because of injury, mastitis, disease, and failure to conceive.

DHIA production records should be studied carefully to evaluate the producing ability of each cow. Consideration should be given to both fortunate and unfortunate circumstances that may affect the production records of an individual cow. It is important to remember that length of lactation and age may influence production. When incomplete records are used, it is helpful to use extension factors to adjust the record to a 305-day basis. It may also be helpful to use mature-equivalent (ME) factors to reduce the effect of age differences between cows. These factors may be obtained from your county agent or State dairy specialists.

To make rapid progress in improving the inheritance for milk production through selection or culling of cows, it is important to be able to rank cows in the herd with reasonable accuracy.

The following methods may be used in ranking cows according to production:

1. Rank according to the 305-day, ME records that were initiated during the previous 12 months or year-season.
2. Rank 2-year-olds according to either actual or 305-day, ME records.

3. With ~~all available 305-day~~ ME records representing living cows, determine average production per cow and adjust for differences in the number of records, using the factors shown below.

4. With all available 305-day, ME records representing living cows, determine the difference between each record and those involving contemporary herd-mates; average these differences (which may be plus or minus) for each cow; and adjust for record number, using the factors shown below.

Although methods 3 and 4 are more difficult than the first two, they will provide more accurate evaluations.

Number of records:	<i>Factor to use</i>
1-----	0.500
2-----	.667
3-----	.750
4-----	.800
5 or more-----	.833

Appendix

Memorandum of Understanding between The Cooperative Extension Service of the

and
The Federal Extension Service
and
The Animal Husbandry Research Division
Agricultural Research Service
United States Department of Agriculture

Relating to the National Cooperative Dairy Herd Improvement and Sire Evaluation Programs

The Cooperative Extension Service of the _____, hereinafter referred to as the Agency, the Federal Extension Service, hereinafter referred to as the Service, and the Animal Husbandry Research Division, hereinafter referred to as the Division, recognizing that cooperation is a matter of working together toward a common end and is not merely one of cooperative financing, desire to enter into this memorandum of understanding for conducting work on the National Cooperative Dairy Herd Improvement and Sire Evaluation Programs.

Participation in this cooperation on the part of the Division is under authority included in the Act establishing the Department of Agriculture, the Department of Agriculture Organic Act of 1944, and the annual appropriation Acts providing funds for the activities of the Division. Participation by the Agency shall be in accordance with applicable laws.

The National Cooperative Dairy Herd Improvement and Sire Evaluation Programs, sponsored by the parties to this agreement, are cooperative undertakings between dairymen, county, State and the Service, and the Division. The National Cooperative Dairy Herd Improvement Program consists of four production recordkeeping plans: Standard Dairy Herd Improvement Association, Dairy Herd Improvement Registry Plan (in cooperation with the various breed registry organizations), Owner-Sampler Plan, and Weigh-a-Day-a-Month Plan. These plans are conducted on a national basis under the general supervision of the Animal Husbandry Research Division, Agricultural Research Service, USDA. The responsible supervising agency in each State is the Cooperative Extension Service. Participating dairymen are organized into State and county cooperatives or associations that have

certain responsibilities delegated to them by the supervising agency.

The National Cooperative Dairy Herd Improvement and Sire Evaluation Programs, as they have been developed in the United States, have been effective educational methods to promote higher production per cow and more effective management of dairy cattle. The results of this improvement are demonstrated by the fact that all Standard Dairy Herd Improvement Association cows averaged 10,796 pounds of milk and 418 pounds of butterfat in 1961, compared to the national average for non-DHIA cows of 6,780 pounds of milk and 254 pounds of butterfat. The program has grown to the point where almost 69,000 cooperating dairymen are keeping dairy production records at their own expense on more than 2½ million cows in 50 States and Puerto Rico.

I. *Purposes:*

A. To improve the producing ability of dairy cattle by providing guides for breeding, feeding, and management practices.

B. To provide information by which it is possible to measure the transmitting abilities of dairy sires to the end that the meritoriously evaluated sires can be selected for breeding purposes.

C. To improve the efficiency and financial position of all dairymen.

D. To provide data for dairy extension workers in developing and conducting effective educational demonstrations and programs.

E. To provide data for research.

II. *Objectives:*

A. To maintain a uniform system of recordkeeping to guide the cooperating dairymen in their herd improvement program and to supply reliable records and

herd improvement information to the Division, the agricultural colleges, and the county, State, and the Service for scientific studies, result demonstrations, and other educational programs.

B. To establish sources of superior dairy inheritance as a means of improving the producing ability of all dairy cattle.

C. To maintain a high standard of integrity in the above recordkeeping system that will give reliability to scientific studies and educational demonstrations; provide authentic information to dairymen who use these records as a basis of breeding, sire selection, feeding, and management; and provide accurate factual information on production, feed costs, reproduction, and other herd data.

D. To summarize, analyze, and publish Standard Dairy Herd Improvement Association results and make them available to all research, educational, and extension workers; cooperating dairymen; and others. No copyright shall subsist in the material published pursuant hereto.

E. To demonstrate the fundamentals of dairy herd improvement to the cooperating dairymen and through the use of the results of this demonstration to teach all interested dairymen of the Nation the value of these practices.

III. *The Agency will—*

A. Assume responsibility for the development and guidance of the National Cooperative Dairy Herd Improvement Program and adaptation of the details of the program to fit the State needs.

B. Conduct a program to keep as many cows as possible on production testing with adequate supervision.

C. Through the State dairy extension specialist, be responsible for—

1. General supervision of the National Cooperative Dairy Herd Improvement Program in the State.

2. Distribution of all record forms, including the report forms provided by the Division which may be needed by the State.

3. Assembling and forwarding, to the Division, production records of all herds enrolled in Owner-Sampler and Weigh-a-Day-a-Month record plans and lactation and herd records of all Standard Dairy Herd Improvement Association cows for use in evaluating sires and other analyses.

4. Summarization and analysis of Dairy Herd Improvement results not supplied by the Division.

5. Making the published results available to county agricultural agents, other extension workers, and other interested parties.

6. Assisting county agricultural agents in the organization, development, and supervision of the National Cooperative Dairy Herd Improvement Program.

7. Training of Dairy Herd Improvement Association supervisors, county agricultural agents, and other personnel working on the program.

D. Through the county agent or other authorized person, be responsible for—

1. General supervision of the National Cooperative Dairy Herd Improvement Program in the county.

2. Distribution of recordkeeping forms and information to cooperating dairymen in the county.

3. Collection of necessary reports and forwarding them to the dairy specialist in charge at the State office.

4. Establishing and maintaining a responsible membership organization for the conduct of the National Cooperative Dairy Herd Improvement Program.

5. Returning to the membership the summaries and results of the testing work.

IV. *The Division will—*

A. Furnish the Agency the necessary uniform lactation and herd report forms (except EDPM monthly report and State adapted forms) needed to provide essential information for the dairymen and data for research analysis, extension teaching, and sire evaluation.

B. Conduct a sire evaluation program based on data received from the Agency and publish the results thereof. Make available sire data for further study and extension use in dairy cattle improvement.

C. Compile summary information on a regional and national basis on all types of dairy production recordkeeping and analyze Standard Dairy Herd Improvement Association production, feed, and cost data from data received from the Agency to show the value of various dairy practices and make these results available to the Agency for extension teaching.

D. Assist in coordinating the State Dairy Herd Improvement Programs with the national program.

E. Conduct research on the various aspects of the program to assure an efficient and economical operation.

F. Furnish an annual report of record forms and other pertinent statistical data to the director of the Agency.

V. *It is mutually agreed that—*

A. The Agency which will be represented by the Dairy Records Committee of the American Dairy Science Association and the Division, working through the American Dairy Science Association, shall establish uniform rules and policies for conducting the Dairy Herd Improvement and Sire Evaluation Programs.

B. The Agency and the Division will consult in the interest of effective cooperation and coordination with respect to all phases of the Dairy Herd Improvement and Sire Evaluation Programs.

C. A representative of the Service will serve as a liaison between the Agency, the Division, and the Extension Committee on Organization and Policy.

D. The Agency and the Division will cooperate in establishing and maintaining Dairy Records Processing Laboratories and collaborate on other regional or national activities to improve the effectiveness of Dairy Herd Improvement and Sire Evaluation Programs.

E. The Agency and the Division will pay the salaries and expenses of their respective employees assigned to this work.

VI. This memorandum of understanding is to define in general terms the basis on which the parties concerned will cooperate and does not constitute a financial obligation to serve as a basis for expenditures. Each party will handle and expend its own funds. Any and all expenditures by the Division made in conformity with the plans outlined in this memorandum of understanding must be in accord with Department rules and regulations, and in each instance based upon appropriate finance papers, such as lease, contract, requisition, letter of authorization, etc. Expenditures made by the Agency will be in accord with its governing rules and regulations.

VII. The responsibilities assumed by each of the cooperating parties are contingent upon funds being

available from which expenditures legally may be made.

Funds of the Agency shall not be expended by any employee of the Division.

VIII. No member of, or delegate to, Congress or resident commissioner, and no officer, agent, or employee of the Government shall be admitted to any share or part of this agreement or to any benefit to arise therefrom.

IX. This memorandum of understanding shall become effective when fully executed. It shall continue in effect indefinitely but may be modified or terminated at the request of either party. Requests for termination or any major modification shall be submitted to the other party for consideration not less than six (6) months in advance of the effective date of such termination or change.

X. Nothing herein shall be construed as interfering in any way with the basic responsibilities and activities of either party.

(Date)

*Director, Cooperative Extension
Service of the*

(Date)

*Administrator
Agricultural Research Service
United States Department of
Agriculture*

(Date)

*Administrator
Federal Extension Service
United States Department of
Agriculture*

DHIA Rules

(Revised and Approved by the American Dairy Science Association in June 1962)

Rule 1. Standard Equipment and Methods

All equipment and methods shall conform to the standards and methods set by the American Dairy Science Association and/or the State Regulatory Agency. The accuracy of all equipment shall be checked as frequently as necessary to insure that equipment is operating within the standards established by ADSA.

The ADSA Dairy Records Committee will offer an opinion of accuracy of equipment or method when they have been tested and results published by three or more colleges, experiment stations, or independent research laboratories. The responsible supervising agency and/or the regulatory agency in each State shall have authority to approve equipment or methods found to produce results within tolerances established by the ADSA Dairy Records Committee.

Tolerances are as follows:

A. Butterfat test on individual cows should be within plus or minus 0.2 of the fat test obtained by conventional sampling methods.

B. Daily milk weights as compared to an accurate scale should be within 3 percent or one-half pound,

whichever is the greater, and the error should be random so it will cancel with repeated sampling.

90 percent of the tests and weights should fall within these limits.

Rule 2. Cooperation of Owner

Owners must make available all registration certificates and other information for permanent identification of animals on test and all their offspring. They must provide the supervisor with freshening and dry dates, purchase and sale dates, abortion dates, and death dates. When requested they must cooperate and assist the supervisor in obtaining feed weights, roughage quality, value of product, breeding dates, and any information needed for calculation of complete DHIA records.

Rule 3. Identification of Animals

Every animal in DHIA herds must be positively identified and recorded in the owner's herd book within 60 days after entering the herd by birth or purchase. A herd registry page is provided for this purpose. Cows on test must be permanently identified with (1) registration numbers if registered, or (2) uniform series eartags as used in DHIA, disease eradication, and artificial breeding (State code, 1-, 2-, or 3-letter prefix, 4 digits).

The supervisor shall verify the identity of each cow when entered on test, by registration certificates if registered or by eartag numbers if not registered, and record the information on appropriate forms. Thereafter, at each milking the supervisor must assure himself of the correct identity of each cow as she is milked.

Tattoo numbers, branded numbers, or private eartags are acceptable identification, provided that they are cross-indexed to one of the above identification systems.

Supplemental Identification.—Neck chains, strap numbers, or other numbering systems may be used on young stock until they enter the milking herd. They also may be used as secondary identification for milking cows, provided that they are cross-indexed with permanent identification.

Rule 4. Production Reports

DHIA lactation records shall be computed and reported for every cow on test for each calving. Monthly and yearly herd reports shall also be computed and reported as required by the county and State extension service.

Rule 5. Cows To Be Tested

DHIA records must be kept on all dairy cows in the herd or on the farm that have ever calved, regardless of ownership, except as specified in the rule on permanent nurse cows. DHIA herds shall consist of all cows that have freshened at least once located on one or more farms under one management.

Members owning or operating more than one farm may divide their herds into farm units, and each may be tested as a separate unit when the units are maintained as separate herds and there is no shifting of cows between herds. In single herds involving two or more distinctly individual breeds, separate herd averages or a composite herd average may be calculated and reported as such.

The owner or his management is required to report to the supervisor all cows added to or removed from the herd since the previous test, as well as first-calf heifers that have calved.

In any case involving the questionable assignment of cows to a herd to influence a herd average, the decision of the local or State board of directors in council with the State extension dairyman in charge of production testing shall be considered final. In special cases involving joint operation of herds or groups of cows, the local board of directors in council with the State extension dairyman shall decide the policy.

Rule 6. Monthly and Bimonthly Testing

Associations may operate on the monthly or bimonthly basis or on both, as approved by the State extension dairyman.

Rule 7. Number of Cows Tested Daily

The number of cows and herds tested daily shall be left to the judgment and discretion of the DHIA board of directors and State extension dairyman concerned. They will consider the ability of the supervisor, milking facilities, and type of records being kept.

The number of cows tested shall be limited as much as necessary to allow sufficient time for the supervisor on each visit to the farm to properly comply with all the Standard DHIA Rules, such as the identification of all animals in the herd, including ear tagging when necessary; proper supervision of milking, including the identification of the cows being milked; using the proper procedures and methods of sampling, including the handling of samples and the use of a locked sample case; obtaining and using his own data; properly recording data on the barn sheet; keeping the owner's herd book up to date; and making all required monthly, yearly, and lactation reports. Sufficient time also shall be allowed for the supervisor to check all his work and reports for accuracy before leaving the farm.

Rule 8. Supervision of Milkers and Cows

The herd owner shall milk his cows in such order that on the testing day cows being milked at the same time will be in close proximity and full view of the supervisor for observation.

The supervisor must be in position to observe the milkers, machines, and cows during the entire milking process.

Rule 9. Supervisor Uses Own Data

The supervisor, or a person or central processing service authorized and approved by the State extension dairyman and the responsible organization, shall compute the production records for a testing period from the data obtained on the testing date.

Rule 10. Centering the Testing Day

Production records shall be calculated by centering the testing day according to the method outlined in the DHIA Supervisor's Manual. All tests shall be applied to the testing period in which made.

Rule 11. Supervisor's Route

In order that the herd owner may not know the exact day the supervisor will visit a farm, the supervisor shall from time to time vary his visits to each farm as much as 3 days ahead of, or 3 days after, the centering day.

Rule 12. Lock Sample Cases

All milk samples, glassware, and the current monthly barn sheet with recorded test day data shall be securely locked by the supervisor when they are not under his immediate observation.

Rule 13. Methods of Sampling

All weighing, sampling, and recording of each milking of each cow for the 24-hour period must be done by the supervisor or person authorized by the local DHIA board of directors. Each cow's milk must be thoroughly mixed immediately before sampling.

Rule 14. Lost Samples

When a sample is lost, the previous month's butterfat test shall be used. When milk weights are not obtained, the pounds of milk for the current testing day shall be estimated from the previous month's record by use of the nurse-cow table in the DHIA Supervisor's Manual. In either case, the record shall be marked "estimated."

Rule 15. Abnormal Tests

In cases of severe sickness or injury, except for the first month of lactation, a 40-percent change in total daily pounds of fat from the preceding test *shall* be considered abnormal. Abnormal high or low records due to causes such as sickness, severe injury, and off feed shall be handled similarly to lost samples.

Rule 16. Retests, Owner's Request

If for any reason a herd owner is not satisfied with the test on his herd, he may call for a retest. The herd owner shall pay the cost of the retest unless otherwise determined by the local board of directors. The use of the requested retest and the regular test shall be at the discretion of the State extension dairyman.

Rule 17. Surprise Tests—DHIA

Surprise tests may be conducted for verification of records of high producing cows and herds and for investigation of rule infractions. They may be ordered by the State or local organization and/or the State extension dairyman.

The use of the surprise test and the payment thereof shall be determined by the organization requiring such tests. Surprise tests shall be preceded by a preliminary dry milking.

Rule 18. Surprise Tests—DHIR

The DHIR surprise test rules are as follows:

A. Production requirements

The State official in charge of DHIA testing shall arrange for surprise testing of cows that meet the

following production requirements, or when requested to do so by the breed registry organization:

1. If, after 90 days of a lactation, a cow equals or exceeds the average daily butterfat production shown in column A of the accompanying table, one surprise test with a preliminary dry milking shall be made within the next 2 months, if possible.

2. If after 90 days of a lactation, a cow equals or exceeds the average daily butterfat production shown in column B of the table, a second test with a preliminary dry milking shall be made before the 305th day of her lactation.

B. Use of Surprise Test

The surprise test shall be used in lieu of the regular test and, if possible, shall be made by a different supervisor. Whether or not a regular test shall also be conducted during the testing period is left to the discretion of the local DHIA board of directors.

C. The Preliminary Milking

The preliminary milking need not be sampled or tested.

D. Cows To Be Included

1. When a surprise test is made in lieu of a regular test, the entire herd shall be included.

2. When a surprise test is made as an additional test during a testing period, it shall include the entire herd, except that in herds requiring more than 1 day's supervision, only those cows meeting the surprise test requirements need be included.

Surprise Test Production Requirements

Age	Col. A	Col. B
2 years-----	2.8 lbs. fat daily-----	2.9 lbs. fat daily.
3 years-----	3.1 lbs. fat daily-----	3.3 lbs. fat daily.
4 years and over---	3.4 lbs. fat daily-----	3.7 lbs. fat daily.

Rule 19. Fresh Cows—Dry Cows—Cows Sold

A cow shall not be tested until the seventh day after she calves, counting the day of calving as the first day. The record, however, is started on the fourth day after calving, counting the calving day as the first day. Cows freshening after the supervisor's regular visit and before the end of the testing period shall be given credit for their production during that period, as calculated on the basis of the results of the next test. Dry cows—the dry date is the first day the cow is not milked. The day a cow is sold and leaves the herd counts as the last day in the herd, and she gets production for that full day.

Rule 20. Aborting Cows or Cows Freshening Without Going Dry

In case a cow aborts while dry, her record shall be figured the same as for a fresh cow. If she aborts while in milk and has carried a calf less than 152 days, her current record shall continue without interruption. If a breeding date is not available and the cow aborts while in milk for less than 200 days, her current record

shall continue without interruption. Otherwise the current record shall end, and a new lactation shall begin.

Rule 21. Cows Nursing Calves

Temporary nurse cow

Cows nursing calves on the testing day are considered on test. Records other than production are taken as usual and recorded in the herd-record book. No milk samples are taken. Milk weights and tests obtained on the last testing day before calves are put on cows or on the first testing day after calves have been removed are used in computing production for the testing period in which calves are nursed, along with the nurse-cow table in DHIA Supervisor's Manual.¹ The recorded number of days in milk for the lactation shall include the number of days the cows nursed calves during the lactation period.

If records are calculated by a computing center, they will be coded as required.

Permanent nurse cow

At the request of the herd owner, a cow that is to be used as a nurse cow throughout the entire lactation period may be removed from test from the date of freshening until the following date of freshening, provided she has at least one complete lactation record.

Permanent nurse cows are to be reentered on test at the following calving unless they are requalified. Cows are disqualified as permanent nurse cows if at any time they are milked by machine or by hand.

Rule 22. Yearly Herd Average

The yearly herd average is calculated on a cow-year basis. As outlined in the footnotes on the monthly herd summary, DHIA-12, the total number of cow-days on test for the year is divided by 365 (366 in a leap year) to obtain the number of cow-years. The totals for the year are divided by the number of cow-years to obtain the herd averages for the year.

Rule 23. Yearly Association Average

The association average is found by dividing the total pounds of milk and total pounds of butterfat by the total cow-years.

Rule 24. Computing Fractions

The weights of milk at each milking and the day's total of milk are to be recorded to the nearest one-tenth of a pound, the month's milk to the nearest 10 pounds. Butterfat tests shall be recorded to the nearest one-tenth of a percent and monthly butterfat to the nearest pound. The price per hundredweight of milk and feed may be taken to the nearest 10 cents. The value of product and cost of feed may be to the nearest whole dollar. If the fraction is less than half, drop it. If half or more, change to the next highest number.

Rule 25. Fraudulent Practices

Any practice that is intended to create or does create any abnormal percentage of butterfat or an abnormal yield of milk is a violation of DHIA rules. Fraudulent practices shall be referred to the local DHIA board of

¹ The nurse-cow table is included in this handbook as table 3 in the appendix.

directors for their consideration. The local board of directors shall decide what action is necessary to prevent or correct such practices.

Rule 26. Relation of Supervisors and Owners

As an employee of the local dairy herd improvement association, the supervisor's duty is to see that the tests are honestly made, accurately recorded, and completely reported. No payment, gift, or gratuity to supervisor is permitted from the owner of a cow or anyone interested in her. The supervisor may act as a collecting agent for the association. He may collect payment for dues and fees for the association, provided a receipt is given the member and a carbon copy of the same receipt is given to the association treasurer. The supervisor shall not test his own herd nor the herd of the immediate members of his family. The supervisor is not at liberty to decide which rules are essential and which are not, but is required to observe all of them in detail. Owners or persons in their employ are equally held responsible with the supervisor for enforcement of these rules.

Rules Applying to DHIR Testing

1. Organization and Supervisional Authority

The DHIR production testing program shall be conducted under the joint administration of the State extension dairyman or other State official in charge of DHIA testing within a particular State and the superintendent of official testing of the appropriate breed registry organization. The State official in charge of DHIA testing shall be responsible for supervising all records in strict accordance with the rules and regulations for standard DHIA testing, the additional requirements set forth herein, and any additional requirements of the appropriate breed registry organization. He shall assume responsibility for the enforcement of all such rules and regulations and shall withhold approval of production records from a herd owner or from a DHIA supervisor which are not made in strict accordance with the rules and regulations. He shall have the further responsibility of calling to the attention of the superintendent of official testing of the appropriate breed registry organization all failures by herd owners to comply with the rules of the DHIR testing program.

It is understood that DHIA records from any herd or any DHIA where the compensation of the DHIA supervisor is made directly by the herd owner will not be accepted or approved under this plan. The superintendent of official testing of the breed registry organization shall be responsible for advising the State official in charge of DHIA testing on all matters concerned with the acceptance of DHIR records by the appropriate breed registry organization. The superintendent of official testing of the appropriate breed registry organization reserves the right to accept or reject any records reported by the State official in charge of DHIR testing within the State and assumes full responsibility for initiating any and all disciplinary action

concerned with records in progress or already accepted and approved by the breed registry organization.

2. Basic Data

A. Identification of Animals.—At the time of the first test of a herd for which an application has been filed for the acceptance of DHIR records, the DHIA supervisor must positively identify each cow in the herd by comparison of the color markings or tattoo mark in the ear with the registry certificate and must make sure that all registered cows owned by the applicant are tested. New cows entering the herd by purchase or freshening must be similarly identified at the time of their first test supervision.

B. Supplemental Identification.—Supplemental identification such as numbers or sealed collars or sealed neck chains, numbers branded on the cows, or other permanent nontransferable identification marks which have been properly cross-checked with the registration certificates, may be used for positive identification at succeeding monthly test supervisions. Unless such suitable supplemental identification is provided and maintained by the owner, the registration certificates must be used at each monthly test for identification of all animals tested. The DHIA supervisor will be held responsible for the absolute accuracy of identification of all cows tested at each test period.

C. The DHIA Supervisor.—The DHIA supervisor will be responsible for reporting each month any change in status of each cow in the herd, such as calving date, purchase date, date of sale and for what purpose, or other dates affecting the production record of each animal, as well as the milk production and butterfat test of each cow during the test period. He shall also report any unusual or abnormal conditions that may affect the reliability of the test, and any violations of the rules by the owner or attendants shall be reported immediately by the DHIA supervisor to the State official in charge of DHIR testing within the State.

D. The Herd Owner.—The herd owner shall be responsible for providing, at the time of each monthly test, all basic data needed by the supervisor for a complete and accurate report on each cow in the herd. He shall be also responsible for supplying the supervisor with complete information on cows removed from the herd.

3. Surprise Tests

The State official in charge of DHIR testing shall arrange for surprise tests when the conditions of Rule 18, DHIA rules (appendix) are met, or when requested to do so by the breed registry organization.

4. Availability of Data

Uniform production data and other data pertinent to the production record shall be provided to the appropriate breed registry organization from the State or regional DHIA processing laboratory on all registered cows in herds enrolled in the DHIR testing program. The processing laboratory shall make two reports for each cow. The first of these reports shall include any and all production for a lactation up to

305 days shall include all production from date of freshening or date of entering the herd to dry date or to date of disposal; reports of such records shall be forwarded at intervals of not more than 90 days. These reports shall be transmitted by the State or regional DHIA processing laboratory to the breed registry organizations on PDCA form 1.

In electronic processing and calculation of production records, the milk weights of each milking shall be added electronically to obtain daily milk weights; the days in the testing period shall be electronically computed from the dates reported; and 305-day and total lactation records shall be electronically computed and reported only after the cow has actually milked 305 days or has completed her lactation.

ation records

5. Costs for DHIR Testing

Each breed organization shall set its own fees for entering a herd on DHIR test. It shall be an annual fee, payable at the time of application, and at yearly intervals thereafter. Notice shall be given by the breed registry organization to the State official in charge of DHIA testing when a breeder has made application for DHIR testing.

The annual testing fee assessed by the breed registry organization shall include a fee to be paid to the State or regional DHIA processing laboratory to defray its costs for reporting DHIR records to the breed registry organization. Payment shall be made to the processing laboratory on a regular basis as reports of DHIR records are received by the breed registry organization.

TABLE 1.—Centering date table—Monthly

Centering date	January, August (31 days)	February (28 days)	February (29 days)	March (31 days) following February (28 days)	March (31 days) following February (29 days)	April, June, September, November (30 days)	May, July, October, December (31 days)	Centering date
1st.....	*17 to 16	*17 to 13	*17 to 14	*14 to 16	*15 to 16	*17 to 15	*16 to 16	-----1st
2d.....	*18 to 17	*18 to 14	*18 to 15	*15 to 17	*16 to 17	*18 to 16	*17 to 17	-----2d
3d.....	*19 to 18	*19 to 15	*19 to 16	*16 to 18	*17 to 18	*19 to 17	*18 to 18	-----3d
4th.....	*20 to 19	*20 to 16	*20 to 17	*17 to 19	*18 to 19	*20 to 18	*19 to 19	-----4th
5th.....	*21 to 20	*21 to 17	*21 to 18	*18 to 20	*19 to 20	*21 to 19	*20 to 20	-----5th
6th.....	*22 to 21	*22 to 18	*22 to 19	*19 to 21	*20 to 21	*22 to 20	*21 to 21	-----6th
7th.....	*23 to 22	*23 to 19	*23 to 20	*20 to 22	*21 to 22	*23 to 21	*22 to 22	-----7th
8th.....	*24 to 23	*24 to 20	*24 to 21	*21 to 23	*22 to 23	*24 to 22	*23 to 23	-----8th
9th.....	*25 to 24	*25 to 21	*25 to 22	*22 to 24	*23 to 24	*25 to 23	*24 to 24	-----9th
10th.....	*26 to 25	*26 to 22	*26 to 23	*23 to 25	*24 to 25	*26 to 24	*25 to 25	-----10th
11th.....	*27 to 26	*27 to 23	*27 to 24	*24 to 26	*25 to 26	*27 to 25	*26 to 26	-----11th
12th.....	*28 to 27	*28 to 24	*28 to 25	*25 to 27	*26 to 27	*28 to 26	*27 to 27	-----12th
13th.....	*29 to 28	*29 to 25	*29 to 26	*26 to 28	*27 to 28	*29 to 27	*28 to 28	-----13th
14th.....	*30 to 29	*30 to 26	*30 to 27	*27 to 29	*28 to 29	*30 to 28	*29 to 29	-----14th
15th.....	*31 to 30	*31 to 27	*31 to 28	*28 to 30	*29 to 30	*31 to 29	*30 to 30	-----15th
16th.....	1 to 31	1 to 28	1 to 29	1 to 31	1 to 31	1 to 30	1 to 31	-----16th
17th.....	2 to 1**	2 to 1**	2 to 1**	2 to 1**	2 to 1**	2 to 1**	2 to 1**	-----17th
18th.....	3 to 2**	3 to 2**	3 to 2**	3 to 2**	3 to 2**	3 to 2**	3 to 2**	-----18th
19th.....	4 to 3**	4 to 3**	4 to 3**	4 to 3**	4 to 3**	4 to 3**	4 to 3**	-----19th
20th.....	5 to 4**	5 to 4**	5 to 4**	5 to 4**	5 to 4**	5 to 4**	5 to 4**	-----20th
21st.....	6 to 5**	6 to 5**	6 to 5**	6 to 5**	6 to 5**	6 to 5**	6 to 5**	-----21st
22d.....	7 to 6**	7 to 6**	7 to 6**	7 to 6**	7 to 6**	7 to 6**	7 to 6**	-----22d
23d.....	8 to 7**	8 to 7**	8 to 7**	8 to 7**	8 to 7**	8 to 7**	8 to 7**	-----23d
24th.....	9 to 8**	9 to 8**	9 to 8**	9 to 8**	9 to 8**	9 to 8**	9 to 8**	-----24th
25th.....	10 to 9**	10 to 9**	10 to 9**	10 to 9**	10 to 9**	10 to 9**	10 to 9**	-----25th
26th.....	11 to 10**	11 to 10**	11 to 10**	11 to 10**	11 to 10**	11 to 10**	11 to 10**	-----26th
27th.....	12 to 11**	12 to 11**	12 to 11**	12 to 11**	12 to 11**	12 to 11**	12 to 11**	-----27th
28th.....	13 to 12**	13 to 12**	13 to 12**	13 to 12**	13 to 12**	13 to 12**	13 to 12**	-----28th
29th.....	14 to 13**	-----	14 to 13**	14 to 13**	14 to 13**	14 to 13**	14 to 13**	-----29th
30th.....	15 to 14**	-----	-----	15 to 14**	15 to 14**	15 to 14**	15 to 14**	-----30th
31st.....	16 to 15**	-----	-----	16 to 15**	16 to 15**	-----	16 to 15**	-----31st

*Date of previous month.

**Date of following month.

TABLE 2.—Centering date table—Bimonthly

Centering date	January (62 days)	February (59 days)	March (59 days)	April, June, Sept., Nov. (61 days)	May, July, Oct., Dec. (61 days)	August (62 days)	Centering date
1st	*1 to 31	*1 to 28	*1 to 31	*1 to 30	*1 to 31	*1 to 31	1st
2d	*2 to 1**	*2 to 1**	*2 to 1**	*2 to 1**	*2 to 1**	*2 to 1**	2d
3d	*3 to 2**	*3 to 2**	*3 to 2**	*3 to 2**	*3 to 2**	*3 to 2**	3d
4th	*4 to 3**	*4 to 3**	*4 to 3**	*4 to 3**	*4 to 3**	*4 to 3**	4th
5th	*5 to 4**	*5 to 4**	*5 to 4**	*5 to 4**	*5 to 4**	*5 to 4**	5th
6th	*6 to 5**	*6 to 5**	*6 to 5**	*6 to 5**	*6 to 5**	*6 to 5**	6th
7th	*7 to 6**	*7 to 6**	*7 to 6**	*7 to 6**	*7 to 6**	*7 to 6**	7th
8th	*8 to 7**	*8 to 7**	*8 to 7**	*8 to 7**	*8 to 7**	*8 to 7**	8th
9th	*9 to 8**	*9 to 8**	*9 to 8**	*9 to 8**	*9 to 8**	*9 to 8**	9th
10th	*10 to 9**	*10 to 9**	*10 to 9**	*10 to 9**	*10 to 9**	*10 to 9**	10th
11th	*11 to 10**	*11 to 10**	*11 to 10**	*11 to 10**	*11 to 10**	*11 to 10**	11th
12th	*12 to 11**	*12 to 11**	*12 to 11**	*12 to 11**	*12 to 11**	*12 to 11**	12th
13th	*13 to 12**	*13 to 12**	*13 to 12**	*13 to 12**	*13 to 12**	*13 to 12**	13th
14th	*14 to 13**	*14 to 13**	*14 to 13**	*14 to 13**	*14 to 13**	*14 to 13**	14th
15th	*15 to 14**	*15 to 14**	*15 to 14**	*15 to 14**	*15 to 14**	*15 to 14**	15th
16th	*16 to 15**	*16 to 15**	*16 to 15**	*16 to 15**	*16 to 15**	*16 to 15**	16th
17th	*17 to 16**	*17 to 16**	*17 to 16**	*17 to 16**	*17 to 16**	*17 to 16**	17th
18th	*18 to 17**	*18 to 17**	*18 to 17**	*18 to 17**	*18 to 17**	*18 to 17**	18th
19th	*19 to 18**	*19 to 18**	*19 to 18**	*19 to 18**	*19 to 18**	*19 to 18**	19th
20th	*20 to 19**	*20 to 19**	*20 to 19**	*20 to 19**	*20 to 19**	*20 to 19**	20th
21st	*21 to 20**	*21 to 20**	*21 to 20**	*21 to 20**	*21 to 20**	*21 to 20**	21st
22d	*22 to 21**	*22 to 21**	*22 to 21**	*22 to 21**	*22 to 21**	*22 to 21**	22d
23d	*23 to 22**	*23 to 22**	*23 to 22**	*23 to 22**	*23 to 22**	*23 to 22**	23d
24th	*24 to 23**	*24 to 23**	*24 to 23**	*24 to 23**	*24 to 23**	*24 to 23**	24th
25th	*25 to 24**	*25 to 24**	*25 to 24**	*25 to 24**	*25 to 24**	*25 to 24**	25th
26th	*26 to 25**	*26 to 25**	*26 to 25**	*26 to 25**	*26 to 25**	*26 to 25**	26th
27th	*27 to 26**	*27 to 26**	*27 to 26**	*27 to 26**	*27 to 26**	*27 to 26**	27th
28th	*28 to 27**	*28 to 27**	*28 to 27**	*28 to 27**	*28 to 27**	*28 to 27**	28th
29th	*29 to 28**		1 to 28**	*29 to 28**	*29 to 28**	*29 to 28**	29th
30th	*30 to 1 ¹		2 to 29**	*30 to 29**	*30 to 29**	*30 to 29**	30th
31st	*31 to 2 ¹		3 to 30**		1 to 30**	*31 to 30**	31st

*Date of previous month.

**Date of following month.

¹ Date of 2d following month.

Estimating Missing Monthly Test-Day Records

Table 3 provides a means for estimating test-day production for months of test missed because the animal was used as a nurse cow or the milk sample was lost, or for some other reason. To use this table, locate the test-day weight for the last available testing period or for the first period after testing is resumed, and use the test-day weight listed in the

succeeding or preceding column for that line. A testing period should be counted separately only if a cow has milked at least 15 days in the period. If the first month is missed, find the test-day weight for the second month of test in column 2 and use the corresponding weight in the first column. For example: If the production for month 2 is 29 pounds, the production for month 1 is estimated as 28 pounds. To determine butterfat credit, use the butterfat test for the last (or first) available testing period.

TABLE 3.—Estimating missing monthly test-day records ¹

Estimated 305-day production	Estimated daily production for each testing period ²									
	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th
	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>	<i>Lb.</i>
4,360	20	21	20	18	16	15*	12	10*	6.6	4.1
4,550	21	22	21	19	17	15	13	10	7.0	4.3
4,790	22	23	22*	20*	18*	16*	14*	11*	7.2	4.5
5,030	23	24	23	21*	19*	17*	14	11	7.6	4.7
5,250	24	25	24*	22*	20*	17	15*	12*	7.9	4.9
5,430										
5,680	25	26	25	23*	21*	18	16*	12	8.3	5.1
5,920	26	27	26*	24*	21	19*	16	13*	8.6	5.3
6,070	27	28	27	25*	22	20*	17*	13	9.0	5.6
6,290	28	29	28*	25	23*	20	17	14*	9.2	5.7
	29	31*	29	26	24*	21	18	14	9.6	6.0

See footnotes at end of table.

TABLE 8. Estimating missing monthly test-day records ¹—Continued

Estimated 305-day production	Estimated daily production for each testing period ²									
	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th
6,560.....	30	32*	30*	27	25*	22*	19*	15*	9.9	6.1
6,740.....	31	33*	31	28*	25	22	19	15	10.2	6.3
7,010.....	32	34*	32*	29	26	23	20*	16*	10.6	6.6
7,200.....	33	35*	33	30	27	24	20	16	10.9	6.8
7,440.....	34	36*	34*	31*	28*	25*	21	17*	11.3	7.0
7,630.....	35	37*	35	32*	29*	26*	22*	17	11.7	7.3
7,840.....	36	38*	36*	33*	29	26	22	18*	11.9	7.4
8,080.....	37	39*	37	34*	30	27	23	18	12.3	7.6
8,330.....	38	40*	38*	35*	31	28*	24*	19*	12.6	7.8
8,480.....	39	41	39	36*	32	29*	24	19	13.0	8.1
8,720.....	40	42	40*	36	33*	29	25*	20*	13.3	8.2
8,900.....	41	43	41*	37	34*	30*	25	20	13.5	8.4
9,180.....	42	44	42*	38	34	31*	26*	21*	13.9	8.6
9,400.....	43	45	43*	39	35	31	27*	21	14.2	8.8
9,610.....	44	46	44*	40*	36*	32*	27	22*	14.4	8.9
9,820.....	45	47	45*	41*	37*	33*	28*	22	14.8	9.2
10,030.....	46	48	46*	42*	38*	34*	29*	23*	15.3	9.5
10,250.....	47	49	47*	43*	38	34	29	23	15.6	9.7
10,490.....	48	50	48*	44*	39	35*	30*	24*	15.9	9.9
10,650.....	49	52*	49*	45*	40	36*	30	24	16.2	10.0
10,920.....	50	53*	50*	45	41*	36	31*	25*	16.5	10.2
11,170.....	51	54*	51*	46	42*	37	32*	25	16.9	10.5
11,350.....	52	55*	52*	47	43*	38*	32	26*	17.2	10.7
11,590.....	53	56*	53*	48	43	39*	33*	26	17.6	10.9
11,780.....	54	57*	54*	49	44	39	33	27*	17.8	11.0
11,990.....	55	58*	55*	50	45	40	34	27	18.3	11.3
12,290.....	56	59*	56*	51*	46*	41*	35*	28*	18.6	11.5
12,440.....	57	60*	57*	52*	47*	42*	35	28	18.9	11.7
12,660.....	58	61*	58*	53*	47	42	36*	29*	19.2	11.9
12,870.....	59	62	59*	54*	48	43*	37*	29	19.6	12.2
13,120.....	60	63	60*	55*	49	44*	37	30*	19.9	12.3
13,300.....	61	64	61*	55	50*	44	38*	30	20.2	12.5
13,540.....	62	65	62*	56	51*	45	38	31*	20.5	12.7
13,730.....	63	66	63*	57	52*	46*	39*	31	20.8	12.9
13,970.....	64	67	64*	58	52	47*	40*	32*	21.2	13.1
14,150.....	65	68	65*	59	53	47	40	32	21.6	13.4
14,430.....	66	69	66*	60*	54*	48	41*	33*	21.8	13.5
14,610.....	67	70	67*	61*	55*	49*	42*	33	22.2	13.8
14,850.....	68	71	68*	62*	56*	49	42	34*	22.5	14.0
15,040.....	69	73*	69*	63*	56	50	43*	34	22.9	14.2
15,280.....	70	74*	70*	64*	57	51*	43	35*	23.2	14.4
15,560.....	71	75*	71*	65*	58	52*	44*	35	23.5	14.6
15,710.....	72	76*	72*	65	59*	52	45*	36*	23.9	14.8
15,920.....	73	77*	73*	66	60*	53	45	36	24.2	15.0
16,170.....	74	78*	74*	67	61*	54*	46*	37*	24.5	15.2
16,350.....	75	79*	75*	68	61	55*	46	37	24.9	15.4
16,590.....	76	80*	76*	69	62	55	47	38*	25.2	15.6
16,840.....	77	81*	77*	70	63	56	48*	38	25.6	15.9
17,050.....	78	82*	78*	71*	64*	57*	48	39*	25.9	16.1
17,230.....	79	83	79*	72*	65*	58*	49*	39	26.2	16.2
17,420.....	80	84	80*	73*	65	58	49	40*	26.5	16.4
17,690.....	81	85	81*	74*	66	59*	50	40	26.9	16.7
17,900.....	82	86	82*	74	67	60*	51*	41*	27.2	16.9
18,090.....	83	87	83*	75	68*	60	51	41	27.5	17.1
18,330.....	84	88	84*	76	69*	61	52*	42*	27.8	17.2
18,540.....	85	89	85*	77	70*	62*	53*	42	28.2	17.5
18,790.....	86	90	86*	78	70	63*	53	43*	28.5	17.7
18,970.....	87	91	87*	79	71	63	54*	43	28.8	17.9
19,180.....	88	92	88*	80*	72*	64	54	44*	29.1	18.0
19,430.....	89	94*	89*	81*	73*	65*	55	44	29.5	18.3
19,670.....	90	95*	90*	82*	74*	65	56*	45*	29.8	18.5
19,860.....	91	96*	91*	83*	74	66	56	45	30.2	18.7
20,130.....	92	97*	92*	84*	75	67*	57*	46*	30.5	18.9
20,280.....	93	98*	93*	84	76	68*	57	46	30.8	19.1
20,500.....	94	99*	94*	85	77*	68	58	47*	31.2	19.3

See footnotes at end of table.

TABLE 3.—*Estimating missing monthly test-day*

Estimated 305-day production	Estimated daily production for each testing period ²									
	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th
20, 770.....	95	100*	95*	86	78*	69	59*	47	31. 5	19. 5
20, 950.....	96	101*	96*	87	78	70*	59	48*	31. 8	19. 7
21, 170.....	97	102*	97*	88	79	71*	60	48	32. 2	20. 0
21, 410.....	98	103*	98*	89	80	71	61*	49*	32. 5	20. 2
21, 590.....	99	104*	99	90*	81*	72	61	49	32. 8	20. 3
21, 840.....	100	105	100*	91*	82*	73*	62*	50*	33. 1	20. 5
22, 910.....	105	110	105*	95	86	76	65	52	34. 8	21. 6
24, 000.....	110	116	110*	100*	90*	80*	68*	54	36. 4	22. 6
25, 100.....	115	121*	115*	104	94	84*	71	57*	38. 1	23. 6
26, 170.....	120	126	120*	109*	98	87	74	59	39. 7	24. 6
27, 270.....	125	131	125*	113	102	91	77	62*	41. 5	25. 7

¹ Based on factors given in table 4.

² Numbers marked with an asterisk (*) were raised to the nearest whole number, and these numbers should be used if a cow's daily production was similarly increased. For example, suppose in the 5th testing period a cow produced 22.5 to 22.9 pounds, the figure "23*" should be used. If her production was between 22.0 and 22.4 pounds, the figure "22" should be used.

Processing centers will find it convenient to use the factors presented in table 4. The factors in column 3 are more accurate than table 3, since they utilize information from the months of test immediately preceding and following the missed month.

Ratio factors for predicting a missing monthly test-day record are given below for three possibilities: (1) the preceding test-day weight is known; (2) the succeeding test-day weight is known; (3) both the preceding and succeeding test-day weights are known.

TABLE 4.—*Factors to use in estimating monthly test-day records* ¹

Month of test	Preceding test-day weight is known ²	Succeeding test-day weight is known ³	Both preceding and succeeding test-day weights are known ⁴
1st.....	-----	0. 95	-----
2d.....	1. 05	1. 05	0. 52
3d.....	. 95	1. 10	. 51
4th.....	. 91	1. 11	. 50
5th.....	. 90	1. 13	. 50
6th.....	. 89	1. 18	. 51
7th.....	. 85	1. 24	. 50
8th.....	. 80	1. 50	. 52
9th.....	. 67	1. 60	. 47
10th....	. 62	-----	-----

¹ Factors developed from New York DHIA Holstein data by Dr. L. D. Van Vleck and Dr. C. R. Henderson of the Department of Animal Husbandry, Cornell University, Ithaca, N.Y., and are used with their permission.

² To estimate the test-day milk weight for a specific testing month, multiply the factor listed under the month of test which was missed by the cow's test-day milk weight for the *previous* testing month.

³ To estimate the test-day milk weight for a specific testing month, multiply the factor listed under the month of test which was missed by the cow's test-day milk weight for the *following* testing month.

⁴ To estimate the test-day milk weight for a specific testing month, multiply the factor listed under the month of test which was missed by the sum of the test-day milk weights for the month *preceding* the missed month and the month *following* the missed month.

Where 1 asterisk follows another asterisk, apply the rounding rule and use the production figure that results.

For testing periods 9 and 10, daily production is carried to 1 decimal point to make it possible to determine into which line a cow's production will fall if production in one of these months is used to estimate another month's production.

An example using the *preceding* test-day record follows:

Assume that a cow produced 34 pounds in month 4 of her lactation. In month 5, her milk weight was lost, or she was used as a nurse cow. To obtain her milk weight for month 5, multiply 34, the milk weight for month 4, by 0.90, the factor for month 5 ($34 \times 0.90 = 30.6$). Her estimated milk weight for month 5 is 30.6 pounds. If the test-day weight is not available for either the fifth or sixth months, the weight for month 6 can be obtained in like manner. To obtain this weight, the estimate for month 5 may be employed: multiply 30.6, the estimate for month 5, by 0.89, the factor for the sixth month ($30.6 \times 0.89 = 27.2$).

An example using the *succeeding* test-day record follows:

Assume that on the first test-day a milk weight was lost, or the cow was used as a nurse cow. A milk weight of 62 pounds was obtained on the second test-day. To obtain the milk weight for month 1, multiply 62, the milk weight for month 2, by 0.95, the factor for month 1 ($62 \times 0.95 = 58.9$). Her estimated milk weight for month 1 is 58.9 pounds. This procedure applies to any period in the lactation when an unknown weight is followed by a known weight.

An example using test-day records preceding and succeeding a missed record:

Assume that a cow produces 57 pounds of milk on test day in month 5, her milk weight is lost in month 6, and she produces 46 pounds in month 7. The test-day production for months 5 and 7 should be added and the sum multiplied by the factor for month 6, column 3 ($57 + 46 = 103$; $103 \times 0.51 = 52.5$ pounds of milk estimated for month 6).

Estimating Production for Months 11 and 12

It is suggested that, if production estimates are desired for months 11 and 12, the production for month 10 (estimated or actual) be reduced by 10 percent as an estimate of production for month 11. The production for month 11 (estimated or actual) should be reduced by 10 percent to estimate production for month 12.

TABLE 5.—*Calculating age in months*

Year	Jan. (1)	Feb. (2)	Mar. (3)	Apr. (4)	May (5)	June (6)	July (7)	Aug. (8)	Sept. (9)	Oct. (10)	Nov. (11)	Dec. (12)	Year
75	301	302	303	304	305	306	307	308	309	310	311	312	75
74	289	290	291	292	293	294	295	296	297	298	299	300	74
73	277	278	279	280	281	282	283	284	285	286	287	288	73
72	265	266	267	268	269	270	271	272	273	274	275	276	72
71	253	254	255	256	257	258	259	260	261	262	263	264	71
70	241	242	243	244	245	246	247	248	249	250	251	252	70
69	229	230	231	232	233	234	235	236	237	238	239	240	69
68	217	218	219	220	221	222	223	224	225	226	227	228	68
67	205	206	207	208	209	210	211	212	213	214	215	216	67
66	193	194	195	196	197	198	199	200	201	202	203	204	66
65	181	182	183	184	185	186	187	188	189	190	191	192	65
64	169	170	171	172	173	174	175	176	177	178	179	180	64
63	157	158	159	160	161	162	163	164	165	166	167	168	63
62	145	146	147	148	149	150	151	152	153	154	155	156	62
61	133	134	135	136	137	138	139	140	141	142	143	144	61
60	121	122	123	124	125	126	127	128	129	130	131	132	60
59	109	110	111	112	113	114	115	116	117	118	119	120	59
58	97	98	99	100	101	102	103	104	105	106	107	108	58
57	85	86	87	88	89	90	91	92	93	94	95	96	57
56	73	74	75	76	77	78	79	80	81	82	83	84	56
55	61	62	63	64	65	66	67	68	69	70	71	72	55
54	49	50	51	52	53	54	55	56	57	58	59	60	54
53	37	38	39	40	41	42	43	44	45	46	47	48	53
52	25	26	27	28	29	30	31	32	33	34	35	36	52
51	13	14	15	16	17	18	19	20	21	22	23	24	51
50	1	2	3	4	5	6	7	8	9	10	11	12	50

Example:

Birth date.....	8-15-54
Calving date.....	6-12-59
Locate year-month of calving date.....	114
Locate year-month of birth date, and subtract.....	56
	<hr/> 58

TABLE 6.—Year-day table

[The difference between 2 dates can be determined by subtracting the year day of the 1st date from the year day of the 2d date. If the dates occur in different years, use the year day on the right half of the table for the last date. In leap year add 1 day for dates occurring after Feb. 28. If dates are to be inclusive, add 1 day.]

	1 Jan.	2 Feb.	3 Mar.	4 Apr.	5 May	6 June	7 July	8 Aug.	9 Sept.	10 Oct.	11 Nov.	12 Dec.	1 Jan.	2 Feb.	3 Mar.	4 Apr.	5 May	6 June	7 July	8 Aug.	9 Sept.	10 Oct.	11 Nov.	12 Dec.	
1	1	32	60	91	121	152	182	213	244	274	305	335	366	397	425	456	486	517	547	578	609	639	670	700	1
2	2	33	61	92	122	153	183	214	245	275	306	336	367	398	426	457	487	518	548	579	610	640	671	701	2
3	3	34	62	93	123	154	184	215	246	276	307	337	368	399	427	458	488	519	549	580	611	641	672	702	3
4	4	35	63	94	124	155	185	216	247	277	308	338	369	400	428	459	489	520	550	581	612	642	673	703	4
5	5	36	64	95	125	156	186	217	248	278	309	339	370	401	429	460	490	521	551	582	613	643	674	704	5
6	6	37	65	96	126	157	187	218	249	279	310	340	371	402	430	461	491	522	552	583	614	644	675	705	6
7	7	38	66	97	127	158	188	219	250	280	311	341	372	403	431	462	492	523	553	584	615	645	676	706	7
8	8	39	67	98	128	159	189	220	251	281	312	342	373	404	432	463	493	524	554	585	616	646	677	707	8
9	9	40	68	99	129	160	190	221	252	282	313	343	374	405	433	464	494	525	555	586	617	647	678	708	9
10	10	41	69	100	130	161	191	222	253	283	314	344	375	406	434	465	495	526	556	587	618	648	679	709	10
11	11	42	70	101	131	162	192	223	254	284	315	345	376	407	435	466	496	527	557	588	619	649	680	710	11
12	12	43	71	102	132	163	193	224	255	285	316	346	377	408	436	467	497	528	558	589	620	650	681	711	12
13	13	44	72	103	133	164	194	225	256	286	317	347	378	409	437	468	498	529	559	590	621	651	682	712	13
14	14	45	73	104	134	165	195	226	257	287	318	348	379	410	438	469	499	530	560	591	622	652	683	713	14
15	15	46	74	105	135	166	196	227	258	288	319	349	380	411	439	470	500	531	561	592	623	653	684	714	15
16	16	47	75	106	136	167	197	228	259	289	320	350	381	412	440	471	501	532	562	593	624	654	685	715	16
17	17	48	76	107	137	168	198	229	260	290	321	351	382	413	441	472	502	533	563	594	625	655	686	716	17
18	18	49	77	108	138	169	199	230	261	291	322	352	383	414	442	473	503	534	564	595	626	656	687	717	18
19	19	50	78	109	139	170	200	231	262	292	323	353	384	415	443	474	504	535	565	596	627	657	688	718	19
20	20	51	79	110	140	171	201	232	263	293	324	354	385	416	444	475	505	536	566	597	628	658	689	719	20
21	21	52	80	111	141	172	202	233	264	294	325	355	386	417	445	476	506	537	567	598	629	659	690	720	21
22	22	53	81	112	142	173	203	234	265	295	326	356	387	418	446	477	507	538	568	599	630	660	691	721	22
23	23	54	82	113	143	174	204	235	266	296	327	357	388	419	447	478	508	539	569	600	631	661	692	722	23
24	24	55	83	114	144	175	205	236	267	297	328	358	389	420	448	479	509	540	570	601	632	662	693	723	24
25	25	56	84	115	145	176	206	237	268	298	329	359	390	421	449	480	510	541	571	602	633	663	694	724	25
26	26	57	85	116	146	177	207	238	269	299	330	360	391	422	450	481	511	542	572	603	634	664	695	725	26
27	27	58	86	117	147	178	208	239	270	300	331	361	392	423	451	482	512	543	573	604	635	665	696	726	27
28	28	59	87	118	148	179	209	240	271	301	332	362	393	424	452	483	513	544	574	605	636	666	697	727	28
29	29	-----	88	119	149	180	210	241	272	302	333	363	394	-----	453	484	514	545	575	606	637	667	698	728	29
30	30	-----	89	120	150	181	211	242	273	303	334	364	395	-----	454	485	515	546	576	607	638	668	699	729	30
31	31	-----	90	-----	151	-----	212	243	-----	304	-----	365	396	-----	455	-----	516	-----	577	608	-----	669	-----	730	31

Examples for Use of Table 6

In using table 6, determine the difference between two dates by subtracting the year-day of the first date from the year-day of the second date. If dates are to be inclusive, add one day.

Examples

Calculate days on test:	
Year-day end of test period	73
Subtract year-day entered herd	60
	<hr/>
Add 1 day (inclusive dates)	13
	<hr/>
Days on test	1
	<hr/>
Days on test	14
	<hr/>
Year-day cow left herd	96
Subtract year-day start of test period	78
	<hr/>
	18
Add 1 day (inclusive dates)	1
	<hr/>
Days on test	19
	<hr/>
Calculate days in milk:	
Year-day end of test period	73
Subtract year-day calving date	50
	<hr/>
	23
Subtract 2 more days for colostrum	2
	<hr/>
Days in milk	21
The above example more fully explained:	
For a cow freshening Feb. 19, with a testing period Feb. 15 through Mar. 14.	
Last day of testing period (Mar. 14)	73
Subtract calving date (Feb. 19)	50
	<hr/>
	23
Since days in milk start with the 4th day after calving, counting the day of calving as the 1st day, Feb. 21 and 22 are also dry days.	
Subtract	2
	<hr/>
Days in milk	21
	<hr/>
Calculate days carried calf:	
Year-day 305-day lactation ended	350
Subtract year-day last bred	130
	<hr/>
Days carried calf	220
	<hr/>
Calculate days dry:	
Year-day calving date	220
Subtract year-day dry date	160
	<hr/>
	60
Add 1 day (inclusive dates)	1
Add 2 more days colostrum	2
	<hr/>
Days dry	63
	<hr/>
The above example more fully explained:	
Year-day calving date (Aug. 8)	220
Subtract year-day dry date (June 9)	160
	<hr/>
	60
Since both dry date and calving date are considered dry dates, 1 day is added for inclusive dates.	
Add	1
	<hr/>
	61
The days in milk do not start until the 4th day after calving, counting the calving date as the 1st day; therefore, 2 more days (the 2nd and 3rd days after calving) are considered dry days.	
Add	2
	<hr/>
	63
	<hr/>

Explanation of a DHIA Sire Record Form—DHIA-1202

The USDA-DHIA Sire Summary Record may be used to appraise a sire's breeding value for production by comparing his daughters' production to that of the herdmates of the daughters. Herdmates (often called contemporaries or stablemates) are defined as cows that calve in the same herd, year, and season as the daughter in question, excluding any of her paternal sisters.

The herdmates comparison is useful because it removes from the evaluation of breeding value, complications arising from herd, year, and season of freshening variations in production.

Herd-year-seasons are based on a 5-month moving average. The appropriate average for the record of a daughter of a sire is obtained by averaging the records of daughters of other sires calving in the herd in the same month as the daughter, in the previous 2 months, and in the succeeding 2 months. For example, the herdmate average for a daughter of the sire calving in March would be obtained by averaging the production of nonpaternally related cows calving in that herd from January through May.

A USDA-DHIA Sire Summary Record contains all usable records reported for daughters of the sire, along with the average production of all available herdmates. All records used are on a 305-day lactation, mature-equivalent, twice-a-day milking basis. When production records for more than one lactation are available for a daughter, her record is based on the average of all her usable, standardized, 305-day lactation records. Records that are incomplete because they were terminated by sale, death, abortion, or discontinuance of test are extended to a 305-day basis. All incomplete records are used in compiling the daughter's average production and the average production of her herdmates.

At the top of the Sire Summary Record is the identification number of the sire, together with his name, birthdate, and the identification of his sire and dam. When a summary record is compiled for a sire for the first time, only the sire number is available.

In the body of the Sire Summary Record are compilations of data included in the evaluation. These data are summarized to show separately non-AI daughter comparisons and AI daughter comparisons. A non-AI sire evaluation based on 5 to 9 comparisons and an AI evaluation based on 10 to 24 comparisons are considered "preliminary."

Preliminary evaluations should be considered only as an indication and not as conclusive evidence of the breeding value of a sire. In general, the greater the number of daughter-herdmate comparisons included in an evaluation, the more reliable the evidence of the sire's breeding value. However, if a non-AI evaluation contains 17 or more unselected comparisons and an AI evaluation contains 50 or more unselected comparisons, additional data will seldom markedly affect the summary.

In the use of the daughter-herdmate comparison procedure, the desirable sire is that which markedly increases the production of his daughters over that of their herdmates. This is because the sire's daughters are compared to other cows that experienced the

same management and feeding conditions as did the daughters. In other words, the daughters and their herdmates had an equal opportunity to produce. The difference in production between a sire's daughters and their herdmates is roughly the same from one level of herd production to another. Generally, a sire with a markedly negative daughter-herdmate comparison should not be expected to raise the production level of a herd.

Additional Facts Helpful

Production data for the daughters and their herdmates should be supplemented by additional information gathered from the herd(s) in which the daughters made their records. In the column headed "CAR" (Conditions Affecting Record) are listed codes for conditions that have affected the records of individual cows. Further information on such records should be obtained from the owner's herd record book.

In addition, a personal evaluation of the herd management and feeding conditions in a herd where a daughter or group of daughters made their records is often useful. Also, elements of the type of the sire's daughters, such as udder attachment, feet and legs, should be evaluated.

Numbered Headings on DHIA-1202

1. AI Service.—If a sire has been in AI service, the code numbers of the State and stud are listed. The first two digits of the code refer to the State in which the stud is located. The second two digits refer to the code number of the stud within the State.

2. Records from States.—Data under this heading indicate the States from which records of daughters included in the sire summary record were made, together with the number of daughters from each State.

The first two digits indicate the State; the last three digits indicate the number of daughters from the State.

3. Summary.—Data in the top portion of this column refer to the total number of daughters with records available for tabulation, and the number of daughters which had one or more records with corresponding herdmate data available. The bottom portion of the column under the subhead "Herd Code" contains the herd code number of the herd from which production records of the daughters were reported.

4. AI.—The letter "A" in this column indicates the daughter is an AI offspring.

5. Breed.—Breed of the daughter is indicated by one of the following codes:

1—Ayrshire	4—Jersey	7—Red Dane
2—Guernsey	5—Brown Swiss	8—Other
3—Holstein	6—Milking Shorthorn	9—Red Poll

6. CAR (Conditions Affecting Record).—Conditions affecting the record are indicated by the following codes:

1—Estimated	3—Incomplete; died	7—Sickness
2—Incomplete; sold	4—Injury	8—Abortion
		9—Nurse Cow

7. Adjusted herdmate average.—As mentioned previously, the herdmate average is the average production of nonpaternally related cows that calve in the same herd and year and within 2 months before or 2 months after the daughter in question. Since the reliability of this measure of herd management and feeding depends on the number of herdmates, the

following procedure is required to standardize for number of herdmates:

$$\text{Adj. Herdmate Av.} = \text{Breed Season Av.} + \frac{M}{M+1} (\text{Herdmate Av.} - \text{Breed Season Av.}),$$

where M is the number of herdmates.

The breed-season averages are calculated from the nationwide 305-day 2X-ME DHIA lactation averages for cows of the breed in question that calved in the preceding 5 years.

In the column "Records Number," the number listed is the average number of herdmates per daughter.

The first number on the column "Milk Pounds" is the average of the Adjusted Herdmate Averages for milk production of all daughters. The second number is the average milk production of all daughters with herdmates minus the Adjusted Herdmate Average. The entries under the subhead "Fat pounds" apply to the corresponding values for fat production.

8. Predicted average.—For all AI sires, an additional criterion of breeding value is calculated from the daughter-herdmate comparisons of their AI offspring. The Predicted Average is an estimate of the producing level of future AI daughters of the sire. In this measure, the sire's evaluation is adjusted for levels of herds in which the daughters produce, and for the number of daughters. The calculations are in two steps:

$$1. A = \text{Daughter Av.} - 0.9 (\text{Adj. Herdmate Av.} - \text{Breed Av.})$$

$$2. \text{Predicted Av.} = \text{Breed Av.} + \frac{N}{N+12} (A - \text{Breed Av.}), \text{ where } N \text{ is the number of daughters.}$$

The breed average, calculated from nationwide DHIA lactation averages of the previous 5 years, can be found in the USDA-DHIA Sire Summary List.

Retabulation of Sire Data

In each sire summary tabulation, all USDA-DHIA Sire Summary Records are brought up to date if sufficient additional data are available to add significantly to the reliability of the sire record.

A DHIA sire summary record is retabulated when there are 50 percent more comparisons available than were included in the previous summary.

Daughter Listings

Data for all daughters of non-AI sires are listed. Registered daughters of AI sires are screened and those meeting a requirement on milk production are listed.

The screening process is carried out on the milk entry under the subhead "WTD DIFF" (Weighted Difference). This value is calculated for each daughter as follows:

$$\text{WTD DIFF} = \frac{N}{1 + (N-1)(0.45)} (\text{Daughter's Av.} - \text{Adj. Herdmate Av.})$$

In the example, N is the number of records that the daughter has. All registered daughters of AI sires whose "WTD DIFF" value for milk is greater than $1\frac{1}{2}$ standard deviations are listed. This point was chosen to allow the listing of the best 7 percent of AI cows.

USDA-DHIA SIRE SUMMARY RECORD

FOR **HOLSTEIN**
BREEDU. S. DEPT. OF AGRICULTURE - AGRICULTURAL RESEARCH SERVICE
ANIMAL HUSBANDRY RESEARCH DIVISION - DAIRY CATTLE RESEARCH BRANCH

1276888 MAVIEW CARROLL DIRECT HEARTY.....

RECORDS FROM STATES 21-002,23-089

SIRE NUMBER

NAME

BORN, 04-06-56 SIRE, 928378 DAM, 2874902

AI SERVICE 23-04 TABULATED 08-63 PREVIOUS TABULATION, 08-62

SUMMARY	IDENTIFICATION OF DAUGHTERS OF SIRE								AVERAGE RECORDS OF DAUGHTERS OF SIRE					ADJUSTED HERD-MATES AVERAGE ⁷			PREDICTED AVERAGE	
	AI ⁴	DAUGHTER NUMBER	DAM		DATE OF BIRTH			DAYS IN MILK NUMBER	RECORDS AVERAGED NUMBER	MILK POUNDS	FAT PERCENT	FAT POUNDS	CAR ⁶	RECORDS NUMBER	MILK POUNDS	FAT POUNDS	MILK POUNDS	FAT POUNDS
			NUMBER	BREED ⁵	MO.	DA.	YR.											
90 AI DAUGHTERS -----									99	13444	3.8	510						
87 DAU WITH HERDMATES -----									95	13458	3.8	511		12	13160	491	12483	46
														DIFF.	298	20		
1 NON AI DAUGHTERS -----									1	15030	4.0	603						
1 DAU WITH HERDMATES -----									1	15030	4.0	603		18	14829	598		
														DIFF.	201	5		
HERD CODE																	WTD.	DIFF.
23570060	A	4892827	2988599	3	2	2	59	305	1	15880	3.6	568		1	11442	427	4438	141
23640023	A	4860340	3454570	3	12	22	58	296	1	16860	3.4	568		19	13179	495	3681	73
23360293	A	4723803	3788765	3	5	14	58	305	1	18800	4.0	755		10	14037	500	4763	255
23360446	A	5544849	3926716	3	7	21	58	305	1	16500	3.4	557		10	11052	423	5448	134
23080058	A	5161453	4324042	3	12	1	58	305	1	19410	3.8	743		10	15195	578	4215	165

FIGURE 1

SUPERVISOR'S WORK SHEET FOR CALCULATING LACTATION RECORDS

Barn Name ROSNI

Item
 1. Date fresh - - - - - Year 51 Month 8 Day 23
 2. Date born - - - - - Year 49 Month 1 Day 26
 3. Age - - - - - Years 2 Months 6 Days 28

PRODUCTION SINCE FRESH

4. Total production for testing year -
5. Total-to-date before freshening -
6. Item 4 minus item 5 -
7. Adjustment for change in centering date (+ or -) -
8. Production since fresh - (Items 6 + 7)

Days in milk (number)	Milk (pounds)	Fat (pounds)
304	7240	243
115	2380	78
189	4860	165
—	None	—
189	4860	165

COMPLETE LACTATION RECORD

1. Production since fresh -
2. Total-to-date before freshening -
3. Complete lactation - (Items 1 + 2)

223	7790	265
115	2380	78
338	10170	343

FIRST 305 DAYS OF LACTATION

1. Production since fresh -
2. Last total-to-date before end of 305 days -
3. Adjustment from next testing period to make 305 days -
4. First 305 days of lactation - (Items 1 + 2 + 3)

223	7790	265
61	1340	44
21	(21 x 23.0) 480	(480 x 3.1) 15
305	9610	324

FIGURE 2

Interpretation and Use of Error Codes for Lactation Records on Form DHIA-1060

Lactation records listed on Form DHIA-1060 have been subjected to extensive auditing of DHIA lactation data reported by the States. This auditing is carried out by electronic computing equipment to assure complete and thorough screening of data to be used in sire evaluation. The records are listed in herd sequence and returned to the office of the State Extension Dairyman.

It is requested that each record be checked for validity, not only on the particular field indicated by the error code, but on *all* other fields as well. Frequently two or more errors are present, but an error code indicates only the first error or conflict encountered.

Supervisors should make the appropriate corrections (or mark "correct") on each record and return the lists to the State Extension Dairyman for forwarding to the Dairy Cattle Research Branch, USDA.

Many records on these lists are correct. When an incoming record on a cow contains data which conflict with previously received data on that animal, *all* records of the cow are removed and coded with the error code indicating the nature of the conflict. Records marked with an (*) in the right margin are records reported in previous years.

Records verified or corrected by the State will be punched and reentered into the Master Lactation File for use in sire evaluation. At the present time, for every 100 new records received, 9 new or master file records are removed due to errors or conflicts.

Alphabetic codes are listed below with an explanation of the probable errors, together with a suggested action for correction:

<i>Code</i>	<i>Interpretation</i>	<i>Suggested action</i>
A-----	<i>Registered Sire Number</i> 1. Sire number conflicts with previous data; or 2. Sire number invalid according to Breed Association records; or 3. Registered cow—sire number lacking or coded as eartag.	Give correct registration number of sire or mark as correct.
B-----	<i>Dam Number</i> 1. Dam number conflicts with previous data; or 2. Dam number invalid according to Breed Association records; or 3. Registered cow—dam number lacking or coded eartag; or 4. Alphabetic characters in registration number.	Give correct identification number of dam or mark as correct.
C-----	<i>Identification Number (Cow, Sire, or Dam)</i> 1. Alphabetic characters or blanks present-----	Give correct identification number or mark as correct.
D-----	<i>Birthdate</i> 1. Contains blanks or alphabetic characters; or 2. Registered cow-year and/or month zero; or 3. Month greater than 12, or day greater than 31; or 4. Conflict with previously reported birthdate.	Give correct date of birth or mark as correct.
E-----	<i>Breed</i> 1. Registered cow with breed "8" code; or 2. Breed of sire zero; or 3. Registered dam with zero breed; or 4. Registered cow, sire, and dam breeds differ.	Give correct breed code of animal.
F-----	<i>Possible Twin</i> 1. Sire and dam equal for 2 different cows, birthdates less than 9 months apart; or 2. 2 or more daughters of same dam with equal birthdates.	Verify or correct cow number, dam number, and birthdate.
G-----	<i>Herd Code</i> 1. State code zero or invalid; or 2. Must not be zero if cow born after 10-59 3. Eartag cow, sire, or dam with invalid State code in identification number.	Give correct Herd Code.
H-----	<i>Conflict in Identification Number (Cow, Sire, or Dam)</i> 1. Dam number higher than cow number; or 2. Conflicting sire and/or dam numbers for 2 or more records of same cow.	Check identification of cow, sire, and dam.
I-----	<i>Registration Number (Cow)</i> 1. Cow number invalid according to Breed Association data; or 2. Canadian registration code for breeds higher than "4".	Check all identification data.
J-----	<i>Equal Identification Numbers</i> 1. Cow number same as dam or sire; or 2. Dam number same as sire number.	Check all identification numbers.
M-----	<i>Eartag Identification</i> 1. Private eartag number; or 2. Disease tag for cow born later than 1-57.	Verify eartag numbers.
O-----	<i>Conflicting Corrections—Identification Verified</i> 1. Two verified records with same cow, sire, and dam differ in birthdate data.	Verify or correct complete identification.
P-----	<i>Lactation Data</i> 1. Contains alphabetic characters or blanks-----	Give correct lactation data.

Code	Interpretation	
Q-----	Calving Data 1. Month zero or greater than 12; or 2. Days greater than 31; or 3. Age at calving less than 14 months; or 4. Year zero; or 5. Less than 9 months between lactations; or 6. Calving date conflicts with current date; or 7. Conflicting reports—equal calving dates, unequal production.	Verify or correct calving date.
R-----	Percent Test 1. Complete lactation: test outside high and low limits for breed; or 2. Incomplete lactation: less than 2.4 or higher than 7.3.	Verify milk, butterfat, and breed.
S-----	Conflicting Corrections—Production 1. 2 records submitted for same lactation—both coded as production corrections.	Verify or correct production data.
T-----	Production 1. Conflicting reports for same calving date—equal production, 1 record coded 3x, 1 record coded 2x; or 2. Zero milk or fat or milk greater than 45,000 or fat greater than 1,800 pounds.	Verify or correct calving date, days 3x, and production data.
V-----	Days in Milk 1. Days milked 3x exceeds days milked	Verify or correct days milked, days 3x.
W-----	Identification Conflicts With Breed Association Data	Verify or correct identification data.
X-----	More than 20 lactations for same cow	Check identification and lactation data.
Y-----	(For use of USDA Office only)	No action required.

Interpretation and Use of Error Codes for Yearly Herd Data on Form DHIA-1080

Yearly herd reports (780's, 781's, 205-9's, or 1105's) containing apparent errors, confictions, or omissions are listed by the computer on Form DHIA-1080 and returned to the State extension dairyman. The source cards and the punched cards for such reports are also being returned so that all can be forwarded to the supervisors for review and correction where appropriate.

Alphabetic codes listed in the remarks column indicate the reason or reasons for which the record was rejected. The record is listed with asterisks appearing over the fields questioned. The entire record should be checked, however, to see that no other errors are present.

PLEASE NOTE:

The yearly herd reports listed were rejected for the "apparent" reasons indicated by the alphabetic codes. It is possible that the record as listed may be correct. It may have been rejected because some part of the data was beyond the limits established for the machine edit.

If cow-years, milk and fat, SNF, and/or protein figures appear to be correct, these data have been placed in file as an incomplete record (production data only) and used as such in the yearly herd summaries.

Code	Field in question	High limit	Low limit
A-----	*Rate of Forage Feeding		
B-----	*Milk Pounds		
	**Milk Pounds (3x)		
	*Fat Pounds		
	**Fat Pounds (3x)		
	*Fat Percent by Breed		
	Ayrshire		
	Guernsey		
	Holstein		
	Jersey		
	Brown Swiss		
	Milking Shorthorn		
	Red Dane		
	Mixed or unknown		
	Red Poll		
	*Protein Pounds		

Code	Field in question	High limit	Low limit
B-----	**Protein Pounds (3x)		
	*Protein Percent		
	*SNF Pounds		
	**SNF Pounds (3x)		
	*SNF Percent		
C-----	**CWT. Succulent Forage		
D-----	*Cost of Concentrates per CWT		
	or		
	Cost of Concentrates higher than Total Feed Cost		
	or		
	No Cost given for Concentrates reported		
	or		
	No Concentrates given for cost reported		
E-----	*Value of Product		
F-----	*Feed Index		
G-----	**CWT. Concentrates		
H-----	**CWT. Dry Forage		
J-----	**Days on Pasture	366	
K-----	Blank or nonnumeric character in record. (May be used as incomplete record.)		
L-----	1105 Card No. 2 only. (First part of record missing—Card No. 1)		
M-----	Duplicate report (One record put in file)		
N-----	Invalid character in herd, year, or month		
	or		
	Invalid State Code		
P-----	Feed Cost exceeds Value of Product by more than \$50		
Q-----	*Feed Cost Per CWT. of Milk		
X-----	Old record—testing year prior to May of current year minus 3		
	or		
	Testing year after April of current year		
Y-----	Zeros in required fields (except as indicated by Z)		Record used as incomplete
Z-----	Zero cow-days or cow-years on test		
	or		
	Less than one cow-year		
	or		
	More than 730,000 cows-days (2,000 cow-years) on 1105		Record not used
	or		
	Zero Milk Pounds		
	or		
	Zero Fat Pounds		
	*High and low limits are set.		
	**High limits are set.		

NOTE.—High and low limits are subject to change. They will be sent to you each year. (No change for item J.)

Ten Points for DHIA Supervisors

1. On your first visit to a farm, make it a point to get acquainted. Favorable first impressions go a long way toward obtaining the cooperation that will help to make your services most useful. Do not talk too much. Be a good listener. Be helpful, but do not put yourself forward.

2. Help; don't hinder. Fit yourself into the mode of living on each farm you visit. Your visit should cause the least possible disturbance to the family's normal living habits.

3. Spend the evening with the dairyman and his family if it is convenient for them to have you do so. If the association operates a central testing laboratory and you do not stay overnight with the dairyman, spend as much time as possible with the dairyman while you are visiting the farm. You can learn much from him and he may learn something from you.

4. Be pleasant and agreeable, but do not carry gossip.

5. Mix praise with helpful criticism in such a way that the dairyman will gladly follow your advice. The best way is to lead up to an idea in such a manner that the dairyman himself will be the first to mention the need for and method of improvement.

6. Keep yourself informed on the new phases of your work. Discoveries are being made continually, and new methods are being developed for conducting a dairy herd improvement program. You should have the latest information at all times.

7. Complete your work and be sure that all records are up to date at each visit. Records that are not complete or are not up to date are not of maximum value to the owner. If your record work is in arrears, the dairyman may justifiably think you are not capable of handling your job.

8. Promote cooperation among your dairymen, but do not make yourself conspicuous.

9. Publish favorable results and give each dairyman and each herd as much publicity as the facts will warrant.

10. Dairy herd improvement association work is an agricultural extension project. It is a part of the local county agent's extension program. The county agent can help you, and you can be of assistance to him. If at all possible, visit his office and talk over your work with him at least once a month.